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ABSTRACT

The first part of this paper is a theoretical discussion which presents an argument for considering the concept of reciprocity to be a moral orientation. A general hypothesis is proposed which states that the salience of an individual's concept of reciprocity in a particular situation is related to the cooperative and moral behavior of the individual in that situation. A certain type of cooperation game is proposed as a paradigm for investigating this hypothesis and for teaching the concept of reciprocity to children of late childhood ages. A major concern of the experimental studies will be to describe the development of cooperative and competitive abilities in late childhood, ages five to ten. A question of particular interest is whether or not children become more adept with age at resolving conflicts of interesting situations where cooperation is required for goal attainment. Another important object of these studies will be to examine the effects of various prior game experiences upon subsequent interaction. A total of three experiments relevant to these issues are reported and two experiments are proposed in order to provide evidence for other hypotheses and to the matters discussed above. (Author/KJ)

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THE CONCEPT OF RECIPROCITY AND THE DEVELOPMENT OF MORAL AND COOPERATIVE BEHAVIOR IN LATE CHILDHOOD

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Abstract

The first part of this paper is a theoretical discussion which presents an argument for considering the concept of reciprocity to be a moral orientation. The concept of reciprocity is defined as some form of the general idea that cooperation and conformity to moral rules and principles may be strategies for the resolution of conflict and the pursuit of self-interest. A general hypothesis is proposed which states that the salience of an individual's concept of reciprocity in a particular situation is related to the cooperative and moral behavior of the individual in that situation. A certain type of cooperation games is proposed as a paradigm for investigating this hypothesis and for teaching the concept of reciprocity to children of late childhood ages.

Two hypotheses are specifically formulated to be investigated experimentally. Hypothesis I: Interaction between two persons will tend to be more cooperative the greater the apparent probability that an individual may maximize self-reward by initiating cooperation. Hypothesis II: In a situation where cooperation is necessary in order for individuals to resolve a conflict of interest and to obtain self-reward, the individuals will be more cooperative if they have previously learned to cooperate as a strategy for resolving conflict and maximizing self-reward.

One major concern of the experimental studies will be to describe the development of cooperative and competitive abilities in late childhood, ages 5 to 10. A question of particular interest is whether or not children become more adept with age at resolving conflicts of interest in situations where cooperation is required for goal attainment. Another important object of these studies will be to examine the effects of various prior game

experiences upon subsequent interaction.

Three completed experiments relevant to these issues are reported and two experiments are proposed in order to provide evidence pertinent to Hypotheses I and II and to the matters discussed above.

The Concept of Reciprocity as a Moral Orientation

> "The most crucial problems in moral philosophy have to do with real or alleged conflicts between the interests of the individual and the interests of social groups." - Robert G. Olson
>
> "Indeed, until we mention this, (the need for coordinating the aims of different people), we hardly seem to have touched on moral rules at all." - P. H. Nowell-Smith

Jean Piaget in his now classic psychological treatise on moral development, The Moral Judgment of the Child, described two basic moral orientations. The first, called heteronomous morality, was based on constraint or on the child's unilateral respect for the rules proscribed by adults. The second orientation was named autonomous morality and it was based on cooperation, reciprocity, and the establishment of a mutual respect for rules. Piaget suggested that all moralities consisted of systems of rules and that the important difference between moral orientations was to be found in the way that rules were justified.

> "Psychologically, the same rule is a completely different reality for the child of 7 who regards it as sacred and untouchable and for the child of 12 who, without interfering with it, regards it as valid only after it has been mutually agreed upon. The great difference between constraint and cooperation or between unilateral respect and mutual respect, is that the first imposes beliefs or rules that are ready made and to be accepted en bloc, while the second only suggests a method - a method of verification and reciprocal control in the intellectual field, of justification and discussion in the domain of morals." (Piaget, 1965, p. 97).

Piaget suggested that the concept of reciprocity was of moral significance, and that it was a very important aspect of a mature moral orientaion. By "mature" it is clear that Piaget meant more than ontological maturity.

Piaget believed that the concept of reciprocity led to an autonomous moral orientation which was better than heteronomous morality not only because it resulted in a more independent person, but also because it led to a closer correspondence between moral rules and moral behavior. He observed that boys whose understanding of the rules of the game of marbles was based on reciprocity and mutual respect were the same boys who actually followed the rules very closely. Younger boys whose respect for the rules was based on authority and constraint paid only lip-service to the rules.

The relationship between the concept of reciprocity and autonomous morality was explained by reference to the rational nature of reciprocity. According to Piaget, "reciprocity imposes itself on practical reason" (p. 317). The concept of reciprocity was described by Piaget as the awareness of a kind of strategy or rule of cooperation and equal treatment which developed in the course of children's interactions with other children as a reasonable pattern for resolving conflicts and coordinating personal motives with the motives of others. Autonomous morality was thought to be closely associated with the development of the concept of reciprocity because the concept originated in the personal experiences and rational thought of the child. This is to say that the justification for moral rules depended not upon authority or some external interest, but rather it was based upon a strategy acceptable to the individual for pursuing his own self-interests in coordination with the pursuits of other persons.

Piaget was not very explicit in his definition of reciprocity, and some liberty has been taken here in defining the concept in the previous paragraph. It does seem, however, that Piaget's conception of the relationship between reciprocity and autonomy necessarily implies that the rational

pursuit of self-interest is inherently involved in the development of the concept of reciprocity and that it is the necessary condition for autonomy. Self-interest is the motivation for the individual to conform to the rules independently of external authority, and self-interest in coordination with the interests of other persons becomes a sufficient condition for creating, abolishing, or changing rules.

The "concept of reciprocity" is defined here as some form of the general idea that cooperation and conformity to moral rules and principles may be strategies for the resolution of conflict and the pursuit of self-interest. The suggestion that an orientation to rules based on considerations of self-interest is a moral orientation runs counter to some popular conceptions of morality. The following discussion attempts to clarify the relationship between the concept of reciprocity and morality, first, by focusing directly on the meaning of morality, and second, by examining the role of self-interest in the conception of morality.

Discussions about the meaning of "morality" always make reference to one or more of the following three issues (stated here as questions) which for the purposes of this paper will be considered as conceptually distinct elements included in the general idea of morality: 1. Rules and principles - what qualifies as a moral rule?, 2. Validity or justification - why should the individual obey a moral rule?, 3. Evaluation - who should be praised and blamed (and to what degree)? Most definitions of morality begin with, or are exclusively concerned with, the first question because the second and third questions presuppose the existence of moral rules. Several typical answers to the question "What qualifies as a moral rule?" are presented in the following paragraph.

P. H. Nowell-Smith (1954) defines a moral principle as: relatively

dominant and concerned with an important matter, a policy that we (or others) avow and adopt in our (or their) more reflective moments, a principle we (or others) are prepared to apply universally. Wilson, Williams, and Sugarman (1967) suggest that a moral principle must be: overriding, prescriptive (individuals are committed to act on the principle), and impartial (for all people on all similar occasions). And Heider (1958) writes that a moral ought is: dispositional (holds in spite of incidental and momentary factors), demanded by a suprapersonal objective order, and impersonal. There is fairly good agreement between these philosophers and psychologists and probably between people in general as to the qualities which all moral rules must share. There is significantly less agreement about the second element of morality, why should the individual obey a moral rule? This distinction between the first two elements in the idea of morality is expressed by Piaget (1965): "All morality consists in a system of rules..... the doctrines begin to diverge only from the moment that it has to be explained how the mind comes to respect these rules" (p. 13).

Persons often confuse the question about what qualifies as a moral rule with the question about why an individual should obey a moral rule. An example is the person who answers the question "Why shouldn't you cheat?" with "Because cheating is against the rules." The rule against cheating certainly qualifies as a moral rule, but to say that a moral rule forbids cheating does not answer the question about why the individual should obey the rule. The philosopher Nowell-Smith (1954) attempted to make clear this distinction between "what is a moral rule?" and "why obey a moral rule?" when he wrote:

> "The words 'just,' 'right,' 'deserve' and 'ought' are used both to say what the rules are and also to defend adherence to them and recommend others to adhere to them (p. 234).....

> it is necessary to distinguish between the judge's question and the legislator's question. Both the questions are moral questions, questions about what someone ought to do, but the logic of the answers is very different."

The purpose in emphasizing the distinction between what qualifies as a moral rule with the question about why an individual should obey a moral rule is to point out that the second question, the question about validity and justification, is an important implication of "What ought a man do?" and is an integral aspect of the idea of morality. In fact, as Nowell-Smith suggests, it is traditionally the central question in ethics.

> "The notion of duty does not play the central role in traditional that it plays in modern ethics and the notion of doing one's duty for duty's sake hardly appears before Kant. Earlier philosophers thought it quite sensible to ask 'Why should I do my duty?'; the obligation to do one's duty needs justifying and can only be justified by showing that doing his duty is, in the short or long run, advantageous to the agent; indeed the classic treatises on the subject might be said to be mainly concerned with this justification." Nowell-Smith, 1954, p. 13.

This is not to suggest that an appeal to self-interest is the only way that philosophers or other persons have attempted to answer the question about justification and validity. Intuitionists claim that we know directly that moral rules are valid, and Kant, for example, claimed that the categorical imperative was given by pure reason. The important point to be made here is simply that the idea of morality, the idea that men ought to do certain things, necessarily is bound up with the question "why should a man obey the moral law?" It should also be clear, however, that for a man to appeal to his own true self-interest as a justification for his behavior does not disqualify his behavior from the attribution of "moral." An act motivated by self-interest may be legitimately called moral.

There is an important difference between the statement that an act is

morally right and the statement that an act is morally praiseworthy. Morally right actions are worthy of varying degrees of moral praise depending on the nature of the action and on the circumstances surrounding it. A brief discussion of moral evaluation, the third element in the meaning of morality as defined in this paper, is necessary in order to show that a morally right action motivated by self-interest may legitimately be the object of moral praise.

Given that a moral rule or "ought" statement is applicable to a situation, the amount of praise or blame that is appropriate for the behavior occurring in the situation is determined by attributions of degrees of the following characteristics: personal responsibility, difficulty, and intentionality. Before we are willing to give moral praise or blame for a behavior, we must first judge that the act was a consequence of some aspect of personality which is generally regarded to be "alterable by praise or blame." (Nowell-Smith, 1954, p. 305). Second, we give a greater amount of praise and blame if we judge that few persons would have acted as did the subject of our judgment. And we give greater praise and blame for intentional acts. Attributions of personal responsibility, difficulty, and intentionality are related to our willingness to give moral praise and blame for good reason. "It is not just an accident that they (moral approval and disapproval) please and hurt and that they are used only in cases in which something is to be gained by pleasing or hurting" (Nowell-Smith, 1954, p. 304). It would make little sense to praise or blame acts that would occur completely independent of praise and blame contingencies. We are not likely to praise or blame a man for his behavior when it is quite clear that nearly all men would have acted the same way in the same circumstance.

A more complete analysis of the process by which persons attribute moral praise and blame is not directly relevant to my purposes in this paper. The preceding discussion should be sufficient to allow showing how a behavior motivated by self-interest may be "moral" and may qualify for moral praise. A behavior is moral insofar as it conforms to moral rules and principles, and the implication of "P ought to do X" is partly "the rule prescribes X" and it may be partly "it is in "P's true self-interest to do X." The attribution of "moral" is certainly not ruled out by knowledge that P's behavior was motivated by self-interest. The evaluation of P's behavior in terms of degree of moral praiseworthiness or blameworthiness for act X depends upon judgments of P's personal responsibility for X, the difficulty of X, and P's degree of intentionality. Knowledge that P acted out of self-interest does not directly bear upon the moral evaluation of his act except insofar as it is relevant to a judgment about the difficulty of X. Behavior conforming to moral rules that is motivated by very obvious or materialistic considerations of self-interest is generally judged to be unworthy of moral praise because it is justifiably assumed that nearly all men would conform to moral rules when such conformity is so obviously in line with self-interest.

Cooperative and helping behaviors conform to moral rules and may be motivationally mediated by a conception of reciprocity which could be expressed in simple terms: "I'll help you so that you will help me." The overt behavior in this case would be "moral" by definition, but the moral praiseworthiness of the behavior would ultimately depend on some kind of a judgment about how many persons would be helpful given the same payoff contingencies. Suppose, for example, that a man helped his neighbor paint a house. Now it could be that the man was willing to help his neighbor because

he knew that he would need his neighbor's help the following week in order to paint his own house. A second possibility is that the man helped his neighbor only because he wanted to maintain good relations with his neighbors in expectation that his good will would be returned in unforseen ways. It seems likely that the man's helpfulness would be more praiseworthy given the second explanation of his motivation than in the case of the first explanation. We expect fewer men to be helpful when the payoff for helpfulness is unforseen or remote.

In some cases the concept of reciprocity may lead to behavior that is morally right and yet not worthy of much moral praise. In other cases it may lead to behavior that is both morally right and praiseworthy. The latter will be particularly true when the consideration of self-interest centers on more long-range and less materialistic concerns. In both cases the relationship between the concept of reciprocity and moral behavior would be essentially the same, and the difference between cases would be one of degree rather than a simple distinction between presence and absence of a concern with self-interest.

The concept of reciprocity was defined as the idea that cooperation and conformity to moral rules may be strategies for the resolution of conflict and the pursuit of self-interest. Because the concept implies that the individual should conform to moral rules, Piaget was justified in considering it to be part of a moral orientation. The moral praiseworthiness of behavior mediated by the concept of reciprocity is evaluated in the same way as is moral behavior mediated by other ideas and motives.

Implications for Moral Education

Piaget (1965) suggested that a moral orientation based on reciprocity and mutual respect was more mature than an orientation based on authority

or some other form of unilateral respect for rules. He believed that the moral orientation which included the idea of reciprocity was associated with greater behavioral conformity to moral rules than for the orientation based on authority. This conformity was presumed to follow from the involvement of self-interest and the rationality inherent in conformity to mutually agreed upon rules. Assuming that the pursuit of self-interest is a very powerful motive for all persons, it seems highly desirable to make the concept of reciprocity an important object of moral education. It is usually the case that moral behavior is most advantageous to the long-range interests of the individual, and it is also probably true that immoral acts are usually impulsive and result from failure to rationally consider the consequences of such acts in light of long-range self-interest. Since the concept of reciprocity involves the awareness that moral behavior may be in the self-interest, the salience of the concept should in most situations relate to conformity to moral rules.

To make the concept of reciprocity an object of moral education implies that children would be taught to identify and clarify their self-interests (emotional and material needs), to recognize interdependencies between persons, to be aware of other persons' feelings and motives, and to recognize moral rules and cooperative responses as strategies for coordinating self-interests with the motives of others. Given that a person had acquired a very salient concept of reciprocity as defined here, it might, of course, be possible that in certain rare situations the person would judge that conformity to a moral rule was not in his self-interest. It is important to notice that to make reciprocity an object of moral education does <u>not</u> imply that the individual is taught to disobey a rule whenever he judges that conformity to the rule is contrary or neutral to the pursuit of his self-interests.

It is possible to argue persuasively that individuals ought to always pursue their self-interests in such cases (Olson, 1965), but this argument is not implied here. To make reciprocity an object of moral education implies only that persons should obey moral rules when it is in their self-interest to do so. There are other legitimate objects of moral education such as benevolence or a sense of duty which may operate independently from self-interest and which may motivate men to act contrary to their self-interests in some situations. The fact that these motives are not the subject of this paper does not suggest that the writer believes them to be unimportant or unworthy objects of moral education.

In summary, the argument here suggests that because the pursuit of self-interest is a very powerful motive, there is good reason to believe that salience of the reciprocity concept, through which self-interest is mediated, relates to cooperative and moral behavior. It would be unfortunate if a person's moral training emphasized that obedience to moral rules was always a matter of self-sacrifice. It is possible that such training might either jeopardize rational habits or, if unsuccessful, might embitter the individual toward the conventional moral code (Olson, 1965). It is unfortunate if moral training fails to channel motivational tendencies of self-interest into socially valued and moral patterns of behavior.

Review of Studies Relating Moral Orientations to Moral Behavior

Previous studies of the relationship between moral thought and moral behavior have generally reported low positive correlations. Harthsorne and May (1928-30) found that moral ideals and beliefs were unrelated to experimental measures of cheating, altruism, and cooperation. However, a measure of moral knowledge administered to 11-12 year olds correlated (with I.Q. controlled) + .34 with total scores on experimental measures of character

and + .43 with character ratings of peers and teachers. Havighurst and Taba (1949) discovered that measures of moral beliefs and values correlated positively .34 to .42 with character ratings of 16 year olds by peers and adults. Kohlberg (1963a), controlling for mental age, reported a positive correlation of .51 between maturity of moral judgment and teachers' ratings for fairness with peers. He also reported that an experimental measure of cheating significantly discriminated between children high and low in maturity of moral judgment and that delinquents were significantly lower in maturity of moral judgment than working-class controls. The evidence is too skimpy to allow generalization about the relationship between moral thought and behavior.

Relevant to the general study of the relationship of moral thought and behavior is the hypothesis that the salience of the concept of reciprocity is related to cooperative and moral behavior of individuals. Two related issues are involved in the empirical test of this hypothesis. The first concerns the generality of the concept of reciprocity and the second is the question of the relationship between age and the concept of reciprocity. Piaget believed that the concept of reciprocity was so general as to relate to overt behavior in the game of marbles, to ideas about the origin and changeability of rules, to the relative importance given to objective or subjective facts in moral judgment, to reasons for believing that lying and cheating is wrong, and to concepts of retributive and distributive justice. Although his evidence suggested that these behaviors and concepts related to age as they should if all of them are mediated by a general concept of reciprocity that develops with age, Piaget unfortunately did not provide evidence to show that the various behaviors and concepts supposedly mediated by reciprocity correlate together for individuals. Other experimenters have found

support for the age trends proposed by Piaget (Kohlberg, 1963a), but perhaps only one study (MacRae, 1954) has investigated the correlation between concepts and behaviors which Piaget believed were mediated by a general concept of reciprocity.

MacRae (1954) questioned 244 boys, aged 5-14, about stories similar to those used by Piaget in his studies of moral judgment. The questions may be grouped into clusters covering the topics of the relative importance of intentions vs. consequences in moral judgment, of ideas about retributive justice, and about right and wrong when interests of friendship conflict with norms. The answers were scored for maturity of response as defined by Piaget, and the maturity of answers correlated positively with age as predicted. MacRae also found significant positive correlations between questions within the clusters, but little to no correlation between clusters when age was controlled. This last result fails to provide support for the hypothesis that the clusters or concepts studied were all mediated by a more general concept of reciprocity. Although this study suggests some possible limitations upon the generality of the concept of reciprocity, the question of generality and, in particular, the question of the relationship of the concept and overt behavior deserves further study.

Much less importance is placed on the concept of reciprocity in Kohlberg's (1963b, 1968) description of moral development than in Piaget's. Kohlberg lists the following stages in the development of 75 boys studied from age 10 to 16: orientation toward punishment, instrumental hedonism, good-boy-good-girl orientation, orientation toward authority, social-contract orientation, and orientation toward conscience and universal principles. Kohlberg (1968) reports that about 50% of a given S's thinking was at one of these six levels regardless of the moral question being discussed, and he presents

evidence suggesting that the stages represent an invariant developmental sequence. Kohlberg's "instrumental hedonism" is probably the orientation most closely related to the concept of reciprocity as defined here. It is very possible, however, that the good-boy-good-girl, the social-contract, and the universal principles orientations are more sophisticated versions of instrumental morality. It is not, however, feasible to trace the development of the concept of reciprocity in Kohlberg's framework where it is studied only very indirectly.

The low positive correlations reported in the studies reviewed here suggest that certain measurable characteristics of moral thinking did not relate highly to other characteristics of moral thinking nor to specific samplings of moral behavior. The relevant experimental studies support the conclusion that moral behavior, like behavior in general, is to a large extent situationally determined (Grim, Kohlberg, & White, 1968; Grinder, 1964; Hartshorne & May, 1928-30; Mischel, 1968; Nelsen, Grinder, & Mutterer, 1969; and Sears, Rau, & Alpert, 1965). To emphasize the importance of situational factors as determinants of moral behavior does not necessarily imply that cognitive factors are unimportant, nor does it imply that persons stop thinking in situations where moral rules apply. More likely, it is probably true that the kind of thinking which occurs in a moral situation is largely determined by the situation.

A Paradigm for Studying the Reciprocity Concept

> "A moral problem presented to the child is far further removed from his moral practice than is an intellectual problem from his logical practice. It is only in the domain of games - if there - that the methods of the laboratory will enable us to analyse a reality in the making" (Piaget, 1965, p. 112).

The general hypothesis to be investigated is that the salience of an

individual's concept of reciprocity in a particular situation is related to the cooperative and moral behavior of the individual in that situation. Although it might be possible to construct a test for inferring individuals' tendencies in certain hypothetical situations to think about cooperative and moral behavior as strategies for the resolution of conflict and the pursuit of self-interest, the experimental approach to be pursued here will not attempt to relate individuals' moral behavior to an independently measured characteristic of their moral thinking. There is no reason to expect that the prevailing approaches to moral training have inculcated a general tendency for individuals to think about cooperative and moral behavior as strategies for the resolution of conflict and the pursuit of self-interest. So there is little reason to expect that an individual's tendency in one situation to think about a certain moral act as potentially serving his self-interest will relate to his thinking in a different situation to which moral rules apply. Thus, a measure of the salience of the concept of reciprocity for an individual in a particular situation would not be expected to necessarily relate to the individual's cooperative and moral behavior in a different situation.

Whether or not the concept of reciprocity becomes a salient aspect of an individual's thinking in a particular situation probably depends first, on characteristics of the situation which might enhance or limit the individual's awareness that a moral art in that situation would promote his self-interest, and second, on the individual's prior learning experiences in the same or similar situations.

Because of considerations discussed in the previous paragraphs, the series of experiments proposed here will focus on the effects of situational variables and the effects of prior experiences on the cooperative and moral

behavior of individuals. The subjects in these studies will be pairs of children, and the dependent measure of cooperative and moral behavior will be the amount of helping, cooperation, and taking turns in the interaction of the dyads. The general paradigm will be that of a two-person game in which only one child can be rewarded on a single trial. It will be possible for either child to receive a reward on a given trial, but it will be necessary for one child to help another child in order for someone to be rewarded. The game will be played for a number of trials so that it will be possible for the children to take turns helping each other obtain prizes. Several different games of the kind just described will be used.

The results of a previous study (Nelson & Madsen, 1969) and the results of Experiments I and III to be reported here suggest that the amount of cooperation and taking turns between children in the games just described is often at a very low level. The children typically behaved as though they believed that they could obtain rewards by their own individualistic efforts, and they often seemed unaware of the possibilities for cooperation and taking turns.

The games appear to be paradigmatic of many real-life situations to which moral rules and principles apply. The form of social interaction in which persons help one another and share rewards is generally considered to be in the long-range self-interests of all group members particularly when the group (family, nation, or species) is recognized to be interdependent. Individual acts which are detrimental to this long-range strategy are considered immoral, and persons are expected to refrain from such acts which may be immediately self-rewarding and to behave in ways which maximize the long-range interests of all group members. The games are particularly paradigmatic of those situations where selfish acts appear to be immediately

rewarding, but where cooperative behavior is in fact required in order for individuals to maximize self-reward.

The games seem particularly well suited for demonstrating the problems caused by conflict of interest and for teaching the advantages of cooperation and moral behavior. It is hoped that games such as these might eventually be developed into useful instruments for teaching children about the consequences of their social behavior and about the dynamics of social interaction.

Experimental Hypotheses

The general hypothesis proposed in this paper suggests that as individuals become more aware of the fact that certain cooperative and moral behaviors promote their self-interests, they will behave more cooperatively and morally. The idea that individuals will cooperate, given adequate knowledge and opportunity, in situations where cooperation is required in order for individuals to pursue their self-interests is not new to social psychology.

Kelley (1968), for example, has reviewed evidence suggesting that persons will cooperate in these situations to the degree that information, opportunity for communication, and repeated occasions for interaction are available. In one study (Vogler, 1968) children were rewarded whenever they placed mechanical styli into opposite holes in a table within .05 second of each other. Specific information about the response-reinforcement contingency was not given to the children, but they were allowed to watch each other and to communicate verbally. Only those pairs in which one child spontaneously verbalized an awareness of the reward contingency learned to cooperate. These studies suggest that knowledge of the possibility of cooperating as a strategy to obtain reward often relates to the amount of cooperative behavior.

Two different approaches will be used here in order to further investigate experimentally the relationship between awareness of cooperation as a strategy for promoting self-interests and cooperative behavior. The first approach will involve manipulation of situational variables that are expected to either limit awareness of or make obvious the fact that cooperation is a strategy for maximizing self-reward. The hypothesis to be studied may be stated as follows. Hypothesis I: Interaction between two persons will tend to be more cooperative the greater the apparent probability that an individual may maximize self-reward by initiating cooperation.

There are two factors which jointly determine whether or not the initiation of cooperation will lead to maximal self-reward for an individual. The first factor is the degree to which the individual is interdependent with the other person, that is, the degree to which the two persons require each other's assistance in order to obtain reward. The second factor is the amount of assistance the individual will receive from the other person if he initiates cooperation compared to the amount he will receive if he does not initiate cooperation. The salience of interdependency (the degree to which the need for mutual assistance is evident) and the expected behavior of the other person (assuming that he too is motivated to obtain self-reward) jointly determine the apparent probability that an individual might maximize self-reward by initiating cooperation.

Previous research (Kelley, et al, 1962; Lindsley, 1966) has demonstrated that in a situation where cooperation would maximize reward for each of two persons, the subjects were more cooperative when they were aware of the fact that their outcomes were determined by interaction with each other than when they performed in a "minimal social situation" where they were unaware of each other's presence and influence. In the experiments

proposed here subjects will be aware of each other's presence in every condition, but certain characteristics of the games will be varied in order to control for salience of interdependency.

Research with adults using the prisoner's dilemma game has generally suggested that cooperative interaction is more likely the greater the relative potential advantage for an individual to choose the cooperative choice (Vinacke, 1969). Although this result supports Hypothesis I, it must be observed that interaction in the prisoner's dilemma game is often very non-cooperative even when the potential gains for cooperative interaction are high compared to gains that would result from competitive interaction. The percentage of cooperative responses has tended to be well below 50 percent (Gallo & McClintock, 1965). The cause for this low level of cooperation in a situation where interdependency is highly salient may be traced to the risk which is entailed by the initiation of cooperation.

The initiation of cooperation in the prisoner's dilemma game results in an interaction which maximizes (compared to a competitive interaction) self-reward for both subjects only if the non-initiating subject reciprocates with a cooperative choice. Since the non-initiating subject can maximize his gain on a trial (at a cost to the other S) by failing to cooperate, there is some reason to expect that the initiation of cooperation will lead to greater loss for the initiating subject than if he had responded non-cooperatively. It is this risk of loss in the absence of mutual trust which according to some theorists (Deutsch, 1962; Gumpert, Deutsch, & Epstein, 1969) explains the low level of cooperation in the prisoner's dilemma game.

In a review of studies examining the beliefs of cooperators and competitors about their partners, the reviewers (Kelley & Stahelski, 1969) found

that in general a subject's behavior corresponded closely to the subject's expectation of what the partner would do. The only exception to this finding was a study (Terhune, 1968) in which subjects who made an initial competitive move were likely to expect either cooperation or competition from their partners. In all of the experiments, however, the subjects who cooperated on the first trial tended to expect that their partners would be cooperative. The evidence does suggest that one variable affecting the level of cooperation in the prisoner's dilemma game is the apparent probability that an individual might maximize self-reward by initiating cooperation.

The procedure to be followed here in experimentally testing Hypothesis I will involve manipulation of the degree and salience of the interdependence between children in a game situation. Reward contingency will also be manipulated so as to make extreme variations in the probability that a child who initiates cooperation will receive assistance in obtaining self-reward from another child who is also motivated to obtain self-reward. These variations will be sufficiently extreme and obvious to warrant the assumption that they will affect noticeable situational differences in the probability that an individual may maximize self-reward by initiating cooperation.

The second approach to testing the general hypothesis that individuals will behave more cooperatively and morally as they become more aware of the fact that certain cooperative and moral behaviors would promote their self-interests will involve a study of the effects of prior experiences on cooperative behavior. The specific hypothesis may be stated as follows.
Hypothesis II: In a situation where cooperation is necessary in order for individuals to resolve a conflict of interest and to obtain self-reward, the individuals will be more cooperative if they have previously learned to cooperate as a strategy for resolving conflict and maximizing self-reward.

An adequate test of this hypothesis must demonstrate that the effect of a prior experience in enhancing cooperation is the result of learning to cooperate as a strategy for resolving conflict and maximizing self-interest rather than simply the result of being reinforced for a general cooperative orientation or simply the result of an increase in trust between dyad members.

The discussion above has involved an attempt to relate the study of cooperation to the study of moral behavior. Certain hypotheses about the determinants of cooperative behavior in particular were considered to have important relevance to the study of moral behavior in general. Experiments designed to test these hypotheses will be described in following sections of this paper. Even apart from possible implications about moral behavior in general, these hypotheses and experiments are directly relevant to the socially important investigation of factors related to the elicitation of cooperative and competitive interaction between persons.

The Elicitation of Cooperation and Competition

Cooperation is defined here as a kind of interaction in which persons share and assist in a joint effort. Competition is defined as a kind of interaction in which persons obstruct the progress of one another while pursuing separate but similar personal goals.

Competition often occurs in social settings in which there exists a conflict of interest between individuals. A conflict of interest may be said to exist when persons are interdependent such that behavior which might be instrumental to the attainment of one person's goals would also be detrimental to the other person's progress toward goal attainment. In some conflict of interest situations competitive behavior may prove to be highly rewarding for the individual who competes most successfully. In other

conflict of interest situations competitive interaction may limit or make impossible goal attainment for all of the parties involved. For this second type of situation, it is sometimes possible for the individuals involved to resolve the conflict with a cooperative strategy by which each person receives a certain limited share of the goal outcomes. Individuals in a conflict of interest situation might, for example, prefer to share outcomes rather than to obtain nothing, or they might be willing to forego goal attainment on one occasion in order to obtain a goal on another occasion.

The initiation of cooperation is more of a problem in a conflict of interest situation than in situations where there is no conflict of interest. The individual who initiates cooperation in a conflict of interest situation must often be willing to limit or forfeit self-reward with the expectation that his cooperative behavior will be reciprocated. This strategy involves taking the risk that cooperation will not be reciprocated. Unless one or both individuals are sufficiently motivated to accept this risk and to initiate cooperation, interaction in a conflict of interest situation will necessarily be competitive. If the individuals pursue their own goals without assisting one another, then by nature of the interdependency in a conflict of interest situation they will be obstructing each other's progress.

In conflict of interest situations cooperation and competition are inverse patterns of interaction, and Hypothesis I may be used to predict that interaction will tend to be more competitive the lower the apparent probability that an individual may maximize self-reward by initiating cooperation.

The Development of Cooperation and Competition in Late Childhood - Ages 5 to 10

Late childhood (ages 5 to 10) is usually considered to be an important period in the child's social development. During this period the child

learns to interact with peers and other persons outside of his immediate family. It is often called the age of group play. In learning to interact with other persons in many circumstances, the child is expected to acquire certain cooperative and competitive skills and to learn which forms of interaction are considered appropriate for various situations. The child undoubtedly learns to use these cooperative and competitive skills to obtain various rewards that are contingent upon his behavior in groups. The degree to which the child increases in his ability to use these cooperative and competitive skills effectively is a matter which has received little attention in psychological studies of child development. Instruments for objectively assessing the cooperative and competitive skills of children which would make such studies possible have not been available.

An early review (May & Doob, 1937) of several observational studies on the development of cooperation and competition led its authors to conclude that both forms of behavior were apparent in the third year and developed rapidly until age six when both cooperative and competitive behaviors were observable in nearly all children. Greenberg (1932) noted that at least 90 percent of the six-year-olds that she observed, while they were building blocks in the presence of other children, had well developed competitive behaviors. She found that this competitiveness usually appeared first at age four. Leuba (1933) reported that rivalry responses among children working in pairs and putting pegs in a peg board first appeared with three and four-year-olds and were the dominant responses of five-year-olds. What evidence exists does seem to support the familiar developmental theme that with age there is an increase in the child's behavioral repertoire.

Piaget (1950) has suggested that in order for individuals to cooperate, they must be able to differentiate their viewpoints. He concluded from his

studies that until the age of about 7 to 8 years, the egocentric quality of children's thinking interferes with the differentiation of viewpoints and "precludes the formation of the cooperative social functions" (Piaget, 1950, p. 162). Starting at about age 7 or 8, "the more intuitions articulate themselves and end by grouping themselves operationally, the more adept the child becomes at cooperation, a social relationship which..... involves a reciprocity between individuals who know how to differentiate their viewpoints."

It seems likely that an increased ability to differentiate viewpoints might also provide a greater capacity for competition. A child's ability to understand and anticipate the behavior of another person in a conflict of interest situation, where the other person might be expected to pursue his self-interests at the child's expense, must certainly relate to the child's capacity to obstruct the progress of that other person.

The assumption that the capacity of children to cooperate and to compete increases with age provides little guidance for predicting which age groups might be more cooperative or more competitive in conflict of interest situations. In most conflict of interest situations there exist factors which elicit both cooperative and competitive response tendencies. Knowledge of both the absolute and relative importance of these various eliciting factors for each age group would be required in order to predict age differences for particular situations.

The proposed experiments will provide for a comparison of cooperative-competitive interaction between older and younger children of late childhood ages. Age differences will be examined for situations having various apparent probabilities that an individual might maximize self-reward by initiating cooperation. A question to be investigated of particular interest is whether or not children become more adept with age at resolving

conflicts of interest in situations where cooperation is required for goal attainment.

The Effect of Prior Experiences Upon Cooperative and Competitive Interaction

One way to regulate cooperative and competitive interaction is to control certain situational variables that are importantly involved in the elicitation of cooperative and competitive behaviors. A second way is to control relevant prior experiences of the individuals to be involved in the interaction.

It is evidently true for social behavior, as for behavior generally, that behavior which is rewarded tends to recur with increased frequency (Azrin & Lindsley, 1956; Lindsley, 1966; Mithang & Burgess, 1968). In one study (Harrison & McClintock, 1965) subjects who were rewarded in a reaction-time game, in which each S was led to believe he was interdependent with another S in working for rewards, were more cooperative subsequently in a prisoner's dilemma game than subjects who either lost reward in the first game or did not play the first game.

It seems likely that the effects of playing a prior game upon subsequent social interaction were not simply the result of reinforcement, particularly if reinforcement is thought to be a process independent from conscious cognitive processes. Very probably these prior experiences affected the Ss' expectations (trust or distrust) about each other's behaviors and they probably caused the Ss to think about and formulate strategies (including cooperation) for maximizing self-reward.

The paradigm for experiments proposed here will involve a comparison of the effects of prior experiences in one of several games upon interaction in a subsequent game in which cooperation is necessary in order for individuals to resolve a conflict of interest and to maximize self-reward. The

following prior experiences will be compared: (1) games where reward is contingent upon competition, (2) common interest games where reward is contingent upon cooperation, (3) conflict of interest games where reward is contingent upon cooperation. For this third type of game it will be possible to vary the likelihood that Ss will learn to resolve the conflict of interest through cooperation by varying the apparent probability that an individual might maximize self-reward by initiating cooperation. Hypothesis II states: In a situation where cooperation is necessary in order for individuals to resolve a conflict of interest and to obtain self-reward, the individuals will be more cooperative if they have previously learned to cooperate as a strategy for resolving conflict and maximizing self-reward. Hypothesis II may be used to predict that the prior experience of playing a conflict of interest game in which reward is contingent upon cooperation and in which it is also likely that Ss will learn to resolve the conflict of interest by cooperating will be the most effective of the various prior experiences in producing a high level of cooperation on the subsequent game.

For certain conditions in one of the proposed experiments, some dyad members will be switched following the prior experience game such that each dyad member will have had the same prior experience treatment but will have a new partner for the subsequent test game. This manipulation will make it possible to control for the possible effect that the prior experiences might have in inducing trust or distrust between certain dyad members.

Completed Experiments I, II, and III

The hypotheses developed in previous sections of this paper were specifically formulated after consideration of the results from several exploratory studies. These completed pilot studies are reported here as Experiments I, II, and III. The proposed Experiments IV and V were designed in order to

answer certain questions and to test certain hypotheses formulated in the preceding pages.

Experiment I

The central purpose of this experiment was to describe age differences in a situation where cooperation was required in order for individuals to resolve a conflict of interest and to maximize self-reward.

Method

Subjects

Children from four combination children's centers in Los Angeles County were matched on the basis of sex, race, and age into 74 pairs. There were 16 pairs of five-year-olds, 25 pairs of 6- to 7-year-olds, and 33 pairs of 8- to 10-year-olds. All of the children were from low to middle income families with working mothers. Most of the children were Anglo-American, but there were several pairs of Afro-American and Mexican-American children in each age group. The children were about equally represented by sex in each age group.

Apparatus

Each pair of children played a game called the Marble-pull (Madsen, 1969). The game consisted of a small four-legged rectangular table (see Fig. 1). There were two strings, each connected to a plastic form containing magnets. When the plastic forms were attached to each other by the attraction of the magnets, they formed a marble holder which could be slid upon the table with a marble in the holder. A child stood at each end of the table holding the end of one string. The marble could be slid in its holder in either of two directions depending on which string was pulled. If both strings were pulled simultaneously, the marble holder would easily pull apart allowing the marble to roll to one side of the table. There was

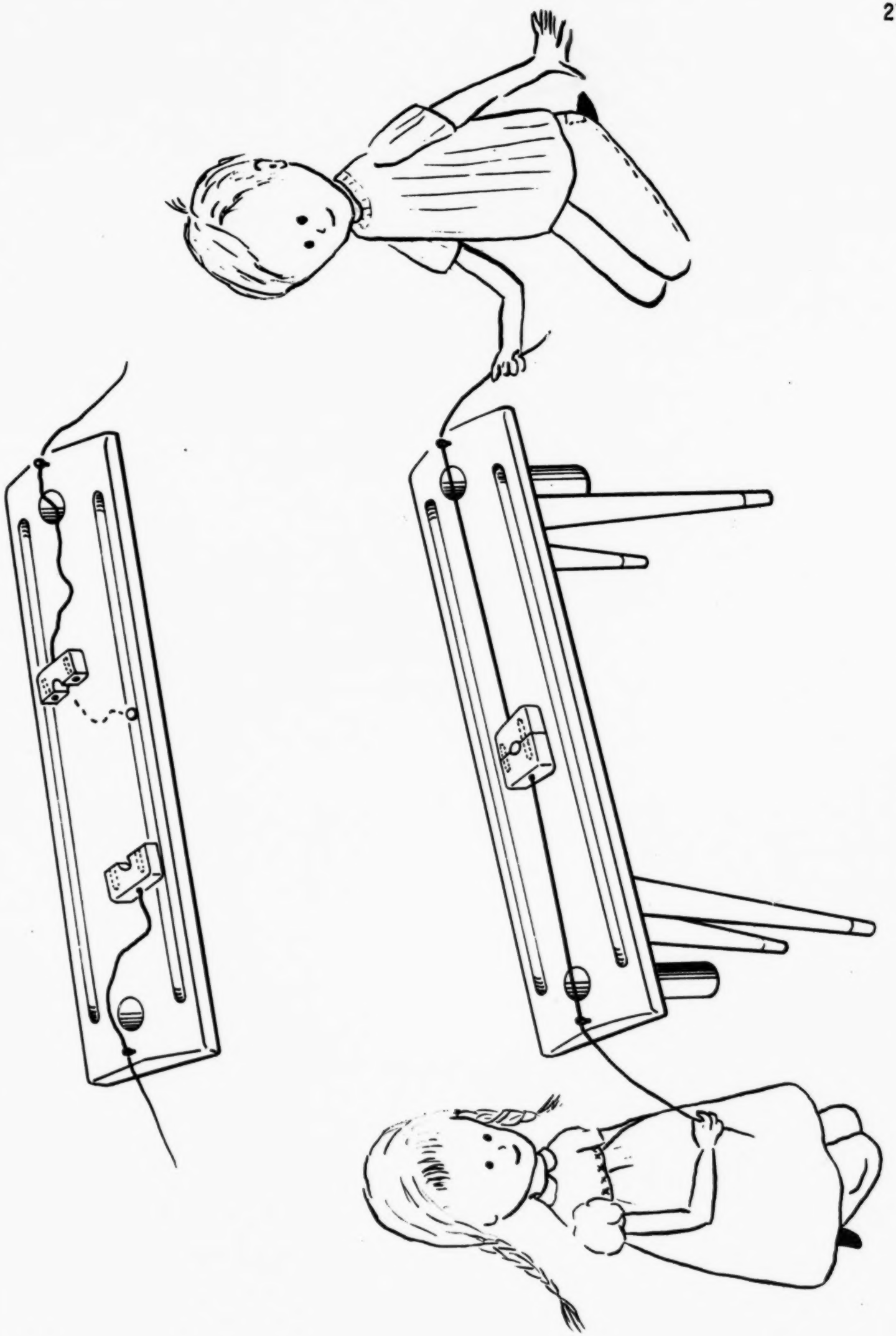

Fig. 1. Marble-pull Game.

a goal cup at each end of the table. If the marble holder was pulled over a goal cup, the marble would drop into that goal. In order for a marble to be pulled to a goal, it was necessary for one child to let loose on his string while the other child pulled on the other string.

Procedure

Each pair of children was taken to a small office and instructed:

> "This is a game where you may get some prizes. First, the game will be played for marbles. When we are finished, you may trade the marbles you get for prizes. These are the prizes (E showed box of prizes to Ss). Each marble is worth one prize of your choice. How many prizes will you be able to choose if you get two marbles during the game? One marble? Four marbles? Here is how the game is played. I place a marble here and then say 'go.' This will be child 1 (name)'s string and this will be child 2 (name)'s string. If a marble goes here, like this (E pulled marble to goal at child 1's end of the table), child 1 will get the marble. If a marble goes here (E pulled marble to other goal), like this, child 2 will get the marble.
>
> If the marble holder breaks like this (E pulled both strings, breaking marble holder), no one will get that marble. We will play the game for this many times (E pointed to 8 marbles), 8 times. Who gets a prize for every marble that goes there? What happens if the marble holder breaks?" E repeated relevant parts of the instructions if the children could not answer these questions correctly.

After each trial, E said "child 1 (name) got (or 'no one gets') that marble, there are n more marbles." After the eighth trial, each child chose one prize for every marble he had received. Every child was allowed to choose at least two prizes. The children were instructed not to discuss the game or the prizes until it was time to go home. The prizes were placed in paper bags which the teachers gave to the children when they left for home. The prizes for 5- to 7-year-olds included rings, whistles, pins, and varied colorful plastic figures and toys. The prizes for 8- to 10-year-olds included pins, pens, magnets, combs, bracelets, pop guns, etc. Without

exception, the children's verbal responses indicated that they were excited by the prizes and motivated to obtain them.

Results

Two indicators of the amount of cooperative interaction between persons playing the Marble-pull game are (1) the number of trials in which subjects cooperated such that a reward was obtained and (2) the degree to which subjects obtained and equitably divided the eight available rewards.

Cooperation trials. Since it was impossible for any child to obtain a reward on a trial unless one child let loose on his string while the other child pulled, a trial in which a reward was obtained may be defined as a cooperation trial. Trials in which the marble holder broke and no one received a prize may be operationally defined as competition trials because on such trials each child contributed to the blocking of the other child's progress. On every trial it was true that either the marble holder broke or one person received a prize, so for this game every trial was categorized as either cooperative or competitive. Table 1 displays the proportions of pairs at every age level that cooperated on each trial.

TABLE 1

Proportion of Pairs Cooperating x Trial x Age

Age	Trials								
	1	2	3	4	5	6	7	8	M
5 (N=16)	.19	.38	.38	.38	.38	.44	.44	.38	.37
6-7 (N=25)	.20	.20	.32	.36	.40	.48	.48	.28	.34
8-10 (N=33)	.06	.09	.15	.30	.33	.39	.45	.36	.27

Note. - N=number of pairs.

A two-factor analysis of variance (Age x Trials) was performed with this data following procedures for a repeated measures design having unequal

cell sample sizes (Winer, 1962). The analysis suggested that the effect of trials was significant (F=4.87, df=7/462, $p < .01$), but that neither the effect of age nor the Age x Trial interaction approached significance. Over trials 1-7 the children became more cooperative and less competitive, and the frequency of cooperative trials was not significantly related to age.

Distribution of prizes. The degree to which the children obtained and equitably divided the eight available prizes may be represented for each pair by the number of prizes obtained by the child who obtained the fewest prizes over the eight trials. A score of 4 indicates the maximum equitable distribution of prizes. The mean scores for distribution of prizes were as follows by age group: 5-year-olds, .7 prizes; 6- to 7-year-olds, 1.2 prizes; 8- to 10-year-olds, .9 prizes. These differences did not approach significance.

There were no significant sex differences in proportion of cooperation trials or in scores representing distribution of prizes.

Verbalizations. For the first 48 pairs (10 pairs of 5-year-olds, 15 of 6- to 7-year-olds, and 23 of 8- to 10year-olds) in this experiment, a complete record was made of all spontaneous verbalizations occurring before and during the game. One or both children verbalized about the possibility of taking turns in 24 of these 48 pairs, and these spontaneous verbalizations about the possibility of taking turns occurred in about half of the pairs regardless of the age group. Common examples of these verbalizations were "Let's take turns" or "If you help me, I'll help you."

For the 24 pairs in which one or both children verbalized the possibility of taking turns, the distribution of prizes was such that for 75 percent of the pairs each child obtained one or more prizes and for 54 percent of the pairs each child obtained two or more prizes. For the 24 pairs in which

neither child verbalized about taking turns, only in 46 percent of the pairs did each child obtain one or more prizes and in only 13 percent of the pairs did each child obtain two or more prizes.

Discussion

In a situation where cooperation was required in order for individuals to resolve a conflict of interest and to maximize self-interest, interaction between children of ages 5 to 10 years was generally competitive although it became more cooperative over trials. Neither the over-all frequency of cooperation nor the increasing frequency of cooperation over trials seemed to vary with age.

It seems peculiar that the older children, who would be expected to be more adept at problem solving, were no more proficient than the younger children at working out a cooperative solution in a situation which required cooperation in order to resolve a conflict of interest and to obtain rewards. A possible explanation is that the greater problem solving capacity of the older children was held in check by a tendency to be more competitively responsive to the conflict of interest situation than younger children. It seems likely that the older children may have been more aware of both (1) the possibility of maximizing self-reward by initiating cooperation and (2) the possibility that the initiation of cooperation might not be reciprocated. Assuming that the apparent probability that an individual might maximize self-reward by initiating cooperation was at an intermediate level, the instigations to cooperative as well as to self-protective and competitive responses were probably greater for older than younger children.

The evidence concerning the relationship between verbalizations about the possibility of taking turns and cooperative interaction suggests that

verbalized awareness of the possibility of maximizing self-reward by cooperating is related to a high level of cooperation. It seems likely that children in pairs in which one or both children verbalized about taking turns were more aware of the possibility of maximizing self-reward by cooperating than children in pairs where such verbalizations did not occur. There is some possibility, however, that children who did not verbalize about taking turns were as aware of the possibility of maximizing self-reward by cooperating as children who did verbalize about taking turns.

Experiment II

The purpose of this experiment was to further describe the development of cooperation and competition during late childhood. The object of study was the interaction of pairs of children as they played a game in which the reward contingency was such that (1) by cooperating both children could obtain maximal reward on a trial or (2) by competing successfully a single child could obtain maximal reward on a trial. The apparent probability that an individual might maximize self-reward by initiating cooperation was relatively high compared to the situation in Experiment I because in the present experiment cooperating did not require that any child forfeit a prize on a trial whereas competing involved a risk of loss for both children.

Method

Subjects

Children from four Combination Children's Centers in Los Angeles County were matched on the basis of sex, race, and age into 32 pairs. Although some of the children were from two of the same centers as the children in Experiment I, no child was a subject for both experiments. There were 8 pairs of children for each of the following four age groups: 5-, 6-, 7-,

and 8- to 10-year-olds. All of the children were from low to middle income families with working mothers. Most of the children were Anglo-American, but there were some Afro-American and Mexican-American children in each age group. The children were about equally represented by sex in each age group.

Apparatus

The game was an adaptation of the Cooperation Board game (Madsen, 1967). Figure 2 shows the positioning of the children and the essential parts of

TABLE 2

Mean No. of Cooperation and Competition Trials by Age

Interaction Category	Age in Years			
	5	6	7	8-10
Competition	.50	1.75	1.38	.25
Cooperation	1.25	1.25	1.75	3.75
Other	2.25	1.00	.88	.00

Note. 1. There were 8 pairs in each age group.
2. There were 4 trials for each pair.

the Cooperation Board. The three target spots were white self-adhesive labels (1 inch diameter). A movable plastic weight, called a pointer, which could easily be pulled and slid upon the board by strings is shown in Fig. 2 at the starting position in the center of the board. Each child held one string in each hand. Either child could make the pointer touch the target spot immediately in front of him by pulling both of the string that he controlled. This could not be easily done, however, if the other child was also pulling in the opposite direction. The mechanics of the game are such that when each child pulled on both strings, it was very difficult for either child to pull the pointer to a target spot unless one child was very much

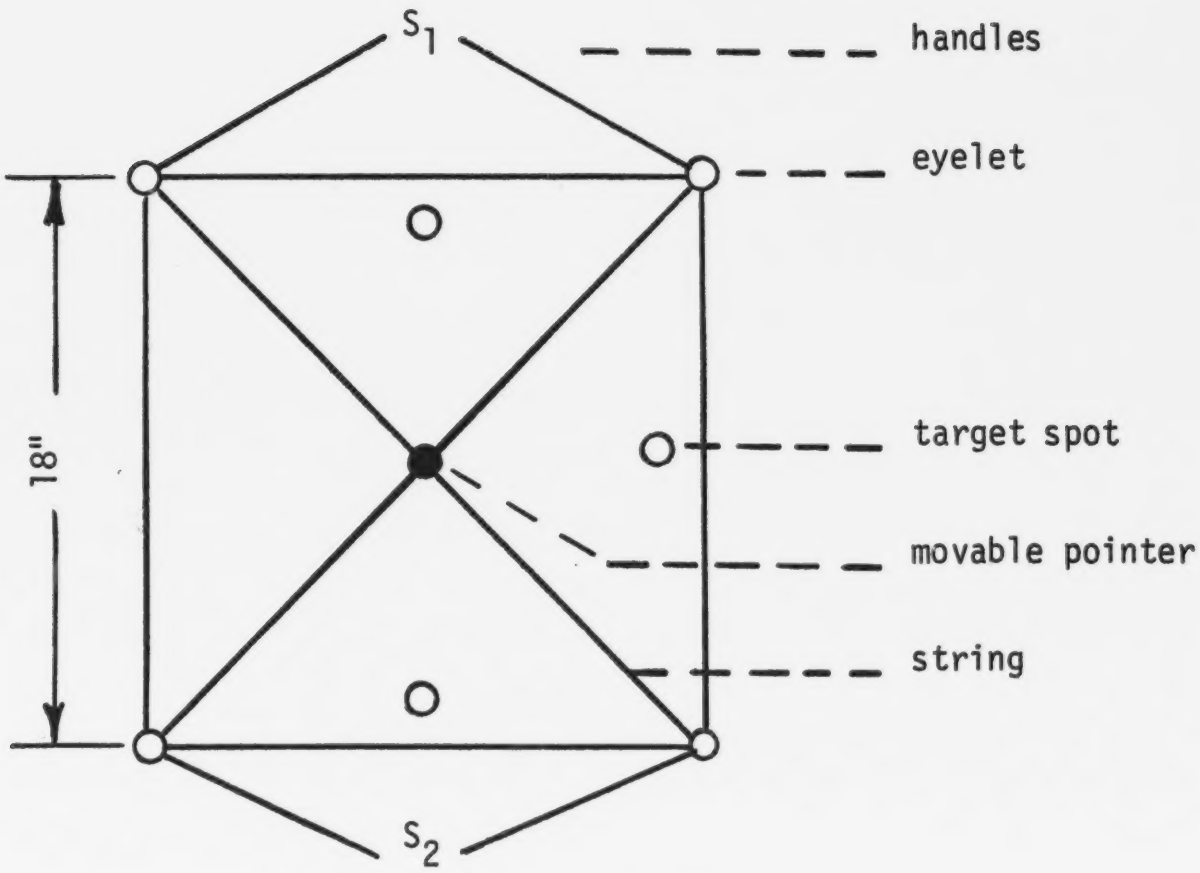

Figure 2. Madsen Cooperation Board as Adapted for Experiment II

stronger than the other.

A third target spot was located on one side of the board equidistant from each child. It was impossible for a single child to move the pointer to this target spot by pulling his strings only. In order to move the pointer to this spot, it was necessary for each child to pull on his string that was nearest the target spot and to refrain from pulling on the other string.

Procedure

Each pair of children was taken to a small office and instructed:

> "This is a game where you may get some prizes. Here are the prizes. If you get a prize during the game, I will put your prize into a bag with your name on it. When we are done with the game, you may trade your prizes for other prizes if you don't like the prizes I have given you. Now I'll tell you about the game."
>
> "This is the pointer. It is possible for the pointer to touch this spot, this spot, or this spot. You can move the pointer on the board by pulling strings. You (name of child 1) may pull these strings, and you (name of child 2) may pull these strings. Now we will practice moving the pointer so that you may understand how it can be moved. See if you can make the pointer go here." The children practiced moving the pointer to a target spot until they could do so with ease. The same procedure was followed for the second and third target spots.
>
> "We will play the game only four times. Each time I will say 'go.' After I say 'go,' if the pointer touches here first (the spot nearest child 1), child 1 (name) will get a prize. If the pointer touches here first (spot nearest child 2), child 2 (name) will get a prize. If the pointer touches here first (spot equidistant from and to one side of the Ss), you both will get a prize, one for child 1 (name) and one for child 2 (name). I will keep time, and if the pointer does not touch any spot before I say 'stop,' no one will get a prize."
>
> About each target spot the children were asked "Who will get a prize if the pointer touches here first?" If necessary, E corrected the children and continued to question them until they could give the appropriate answer. Finally, the children were told "You may talk, and you may play the game any way that you wish."

If no target spot was touched within 10 seconds after the signal to begin, E said "stop" and no one was rewarded for that trial. After the fourth trial, each child was allowed to choose at least one prize. The children were instructed not to discuss the game or the prizes until it was time to go home. The prizes and the manner of dispensing them were the same as in Experiment I.

Results

Trials in which the pointer was moved to the target spot equidistant from and to one side of the subjects may be called cooperation trials. Trials for which none of the target spots were touched within 10 seconds may be called competition trials. On such trials the children interferred with one another's progress and neither child was able to obtain reward. The third possible type of trial outcome was for one child to pull the pointer to the target spot immediately in front of that child. Such an outcome was possible by either of the following interaction patterns: (1) the children competed and one child was much stronger or more persevering than the other, or (2) one child passively cooperated by helping the other child obtain a reward. Trials having this third type of outcome were given the interaction category of "other" because such an outcome could follow only from some kind of cooperative or competitive interaction quite different from that which is categorized here as "cooperation" or "competition."

The mean number of trials (out of a possible 4) categorized as competition trials, cooperation trials, and "other" are listed for each age group in Table 2. A single-factor analysis of variance suggested that the number of competition trials differed significantly between age groups ($F=3.3$, $df=3/28$, $p<.05$). A Newman-Keuls test suggested that the mean

number of competition trials for the 6-year-olds was greater than for the 8- to 10-year-olds, and that the other differences between competition means were not significant at the .05 level. Interaction in which competition was so intense that the children prevented one another from obtaining reward was more frequent for 6-year-olds than for 8- to 10-year-olds.

A second single-factor analysis of variance showed that the number of cooperation trials also differed significantly between age groups (F=5.9, df=3/28, $p < .01$). According to a Newman-Keuls test on the differences between means, the mean number of cooperation trials for 8- to 10-year-olds was significantly greater than for the other three age groups ($p < .01$). The 8- to 10-year-olds cooperated in moving the pointer to the target spot which allowed both children to obtain rewards more often than did the younger children. On the fourth trial all eight of the 8- to 10-year-olds pairs cooperated in this manner, whereas the numbers of pairs cooperating on the fourth trial for 5-, 6-, and 7-year-old pairs were respectively: 4, 3, and 4.

A third single-factor analysis of variance suggested that the number of trials for which interaction was classified as "other" differed significantly between age groups (F=4.9, df=3/28, $p < .01$). A Newman-Keuls test showed that only the difference in the mean number of "other" trials between 5-year-olds and 8- to 10-year-olds was significant at the .01 level.

Data on the distribution of rewards between pair members and the experimenter's observational impressions suggest that the interaction of 5-year-olds on these trials categorized as "other" might best be described as domination-submission. Although the 5-year-old child who did not obtain a reward on such trials was clearly dissatisfied, he seldom seemed to offer much resistance to his partner's actions. The submissive children's

behavior may have been passively cooperative, but it was not generally a reciprocal kind of cooperation. Although seven of the eight 5-year-old pairs had at least one trial categorized as "other," in only two pairs was reward obtained on these trials distributed over trials such that both children obtained a prize.

There were no significant sex differences at any age level in this game.

Discussion

Older children were more cooperative than younger children in the situation studied in this experiment. The less egocentric outlook of the older children probably allowed them to better forsee (1) that seeking reward for self only would cause their partners to respond competitively and would thus involve a risk of not obtaining reward and (2) that the initiation of cooperation would probably be reciprocated because cooperation would lead to maximal reward for both children. Although the 6-year-olds were more competitive than the 8- to 10-year-olds, it does not necessarily follow that 6-year-olds are generally more competitively responsive in situations where there may exist a conflict of interest. It seems more reasonable to suppose that the competitive responsiveness of the older children was overcome to a much greater extent than for the 6-year-olds by their sensitivity to the possibility of maximizing self-reward by initiating cooperation.

That older children were more cooperative than younger children in this experiment, but not in Experiment I, may be explained by the fact that in Experiment II the apparent probability that an individual might maximize self-reward by initiating cooperation was greater than in Experiment I. In Experiment I the initiation of cooperation meant forfeiting the reward on one trial with the risk that one's cooperation might not be reciprocated on

the next trial. In Experiment II the initiation of cooperation did not involve forfeiting a reward, and both children could obtain maximal reward on a single trial. It seems likely that in Experiment II, but not in Experiment I, the instigation to cooperative behavior relative to the instigation to competitive behavior was greater for older children than for younger children.

The domination-submission kind of interaction which commonly occurred between the 5-year-olds was similar to the interaction of 4-year-olds observed in a previous study (Nelson & Madsen, 1969). This pattern of interaction was probably indicative of a large diversity between 5-year-olds in the degree to which they have acquired cooperative and competitive responsiveness. If, for example, one member of a dyad of 5-year-olds continually responded competitively and the other member continually responded non-competitively, a domination-submission kind of interaction would result. Domination-submission interaction did not occur among 5-year-olds in Experiment I because for the Marble-pull game a rather passive non-cooperative kind of response was sufficient to prevent a highly competitive child from dominating a potentially submissive child.

Experiment III

This experiment was designed in order (1) to test the effect of a variation in reward contingency upon interaction in a situation where cooperation was required in order for individuals to obtain rewards and (2) to examine the responsiveness of children at various ages to this variation. It was expected that interaction would be more cooperative and less competitive with a group reward contingency in which no conflict of interest existed and the apparent probability was very high that an individual might maximize

self-reward by initiating cooperation. Interaction was expected to be more competitive and less cooperative (relative to the group reward contingency condition) with an individual reward contingency in which there existed a conflict of interest and in which the apparent probability that an individual might maximize self-reward by initiating cooperation was lower than in the Group Reward condition.

Method

Subjects

Children from five Combination Children's Centers in Los Angeles County were matched on the basis of sex, race, and age into 60 pairs. None of the children had been subjects in Experiments I and II. There were 20 pairs of children for each of the following three age groups: 5-, 6- to 7-, and 8- to 1-year-olds. The sexes were equally represented in each age group. Within each age and sex grouping, pairs were assigned randomly into one of two experimental conditions. All of the children were from low to middle income families with working mothers. Most of the children were Anglo-American, but there were some Afro-American and Mexican-American children in each age group.

Apparatus

The Pull-block game[1] was used for this experiment. In this game each child was assigned to one of two ropes upon which the child could pull or let loose. Each rope was 44 inches long and had four 1 3/8 inch square plastic blocks strung at intervals of four inches starting at one end of the rope. The blocks were securely fastened to the ropes with set screws.

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[1]The Pull-block game was designed and constructed by the present author in collaboration with M. C. Madsen following his suggestion that the general paradigm used by Mintz (1951) be extended into a game appropriate for small children.

The ropes and attached blocks could be pulled through a 1 1/2 inch square opening in a movable block of transparent plastic mounted at the top of a wooden ramp. The ramp and plastic block were attached to a wooden structure that was clamped onto the top of a small table (see Fig. 3).

The ramp had dividers to prevent the ropes from tangling before reaching the opening. The square opening had one small notch on each of two sides (see Fig. 3) so that it was possible for a block on one rope to pass through the opening if, and only if, the other rope was positioned in one of the notches. Whenever the ropes were pulled such that either (1) one block from each rope arrived at the opening simultaneously or (2) one block arrived at the opening while the other rope was not in a notch, the progress of the game was temporarily blocked. If the pull on the ropes was then lessened, the blocks would slide back down the ramp thus ending the blocking.

Whenever the progress of the game was blocked, the pressure against the movable plastic block at the top of the ramp activated a resetable electric counter and timer which automatically recorded the number of such blockings as well as the accumulated blocking time. It was possible to deactivate the counter and timer with a switch for that purpose.

Procedure

The game was played in a small private room. The children were told that they could receive prizes, but that before playing the game, it would be necessary to learn how it worked. They were instructed about use of the notches and shown how to pull first one block on one rope and then one block on the other rope through the opening. They were also told that they would not be allowed to touch the other person's rope or blocks or the apparatus. The children then practiced pulling the ropes in a manner such

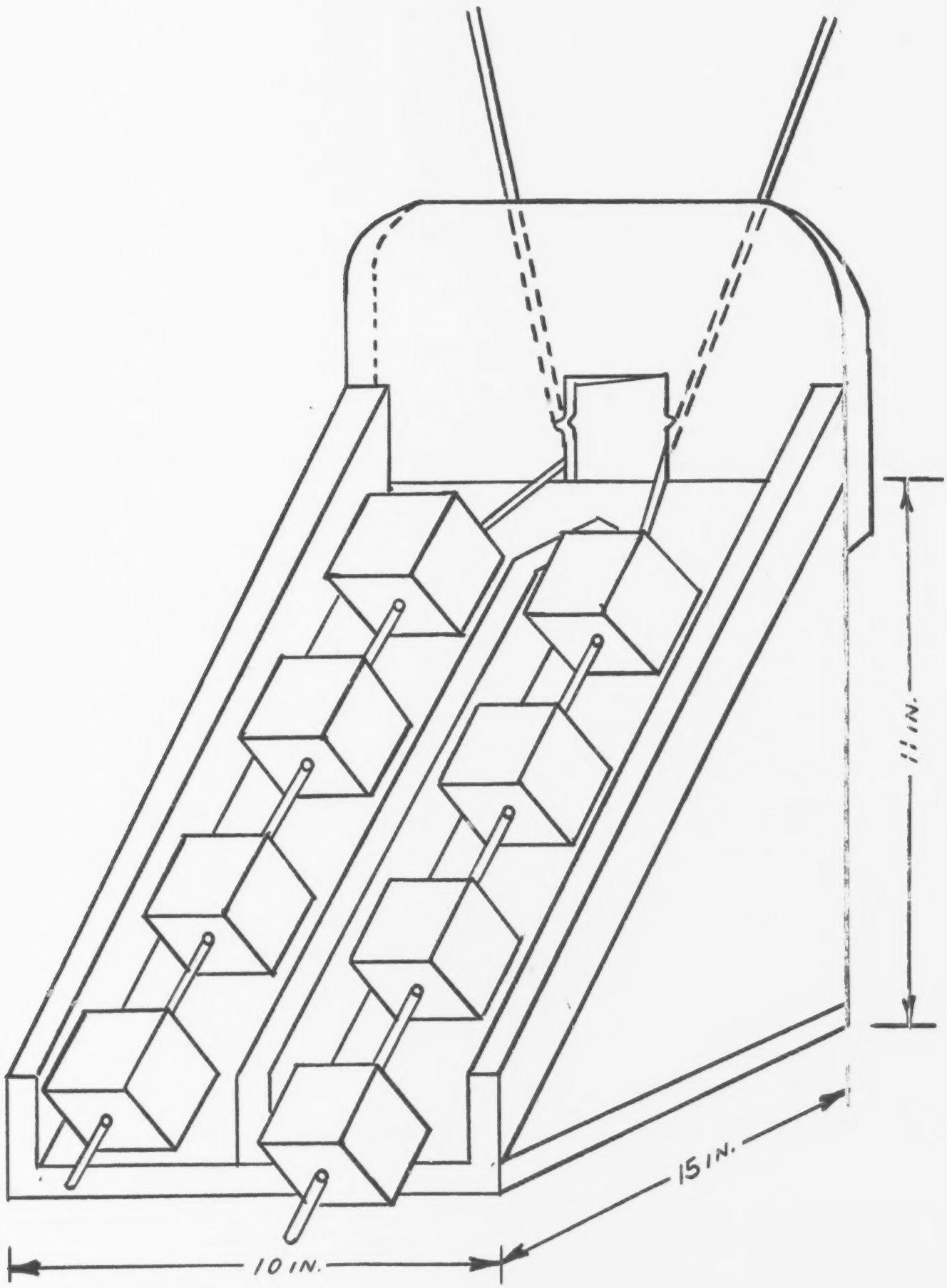


Fig. 3. Pull-block Game

that they alternated in assisting one another pull through one block at a time. They were given whatever time and instruction that was necessary in order to pull all of the blocks through the opening in this manner twice (two trials with no time limit). Then there was a third practice trial in which one child was told to hold his rope in the notch while the other child pulled all of his blocks through the opening at once. This was described as "another way that you may play the game."

Following these three practice trials, the children were shown some small paper tokens and told: "You may get some paper coins like this during the game. Every coin is worth one prize. After the game is over, you may choose one prize for every coin that you receive. Here are the prizes. How many prizes will you be able to choose if you get two coins?" E questioned each child until the coin-prize relationship was understood. The following instructions were given depending on the experimental condition. Each instruction was given twice.

> Group Reward. "If all of the blocks on both ropes are pulled through the opening before I say 'stop,' each of you will get a coin, one for you and one for you. If some of the blocks are not pulled through the opening when I say stop, no one will get a coin. For example, if one block is not pulled through the opening, like this (demonstration), and I say 'stop,' no one will get a coin."
>
> Individual Reward. "There will be one coin every time. The first person who pulls their rope all of the way through the opening before I say 'stop' will get the coin. If no one pulls their rope all the way through, all four blocks through the opening like this (demonstration), before I say 'stop,' no one will get the coin."

All subjects were told that the game would be played six times, that talking was allowed, and that they could play the game any way that they wished. As soon as one child pulled a rope all of the way through the

opening, the E pushed the switch to deactivate the counter and timer. The second child was then given time to pull his rope through the opening. If neither child had pulled a rope all the way through the opening after 20 seconds, E said "stop" and pushed the switch. After each trial, E dispensed the paper coins for that trial and reminded the children of the number of remaining trials. After the sixth trial, each child was allowed to choose at least one prize. The children were instructed not to discuss the game or the prizes until it was time to go home. The prizes and the manner of dispensing them were the same as in Experiments I and II.

Results

The results were analyzed by examining two kinds of data relevant to cooperative-competitive interaction.

Blocking time. This measure represents for each trial the accumulated time in seconds during which pressure upon the movable block at the opening activated the timer and indicated that the progress of the children was being blocked. The greater the blocking time, the greater is the indication that interaction was competitive. The mean blocking times for the various age groups as a function of reward contingency may be seen in Table 3.

TABLE 3

Mean Blocking Time in Seconds as a Function of Reward Contingency and Age, Trials Collapsed

Reward Contingency	Age in Years		
	5	6-7	8-10
Group Reward	1.0	.4	.3
Individual Reward	2.4	4.8	4.4

Note. - N=10 pairs in each cell.

Inspection of the results indicated that trial and sex differences did not approach significance, so the results for these factors were collapsed in the present analysis.

A two-factor analysis of variance (Reward Contingency x Age) suggested that blocking time was significantly greater with individual reward than with group reward (F=15.0, df=1/54, $p < .01$). The main effect of age and the interaction of age with reward contingency did not approach significance. Tests for the simple effects of reward contingency for each age grouping suggested that blocking time was significantly greater with individual reward than with group reward for the 8- to 10-year-olds (F=7.71, df=1, $p < .01$) and for the 6- to 7-year-olds (F=8.88, df=1, $p < .01$). However, the blocking time for 5-year-olds did not differ significantly between reward contingency conditions.

Time to solution. This measure represents the time in seconds between the signal to begin a trial and the completion of the trial by the first child who pulled his rope all of the way through the opening. The maximum time to solution was 20 seconds because a trial was stopped after 20 seconds if no child had successfully completed the trial. The lower the time to solution, the greater is the implication that interaction was cooperative. The mean times to solution for each age group in both reward contingency conditions are listed in Table 4.

TABLE 4

Mean Time to Solution in Seconds as a Function of Reward Contingency and Age, Trials Collapsed

Reward Contingency	Age in Years		
	5	6-7	8-10
Group Reward	12.5	8.3	5.3
Individual Reward	12.1	12.7	13.3

Note. - N=10 pairs in each cell.

Inspection of the results indicated that trial and sex differences did not approach significance, so the results for these factors were collapsed in the analysis reported here.

A two-factor analysis of variance (Reward Contingency x Age) indicated that the main effect of reward contingency was significant (F=12.1, df=1/54, $p<.01$) and that the main effect of age did not approach significance. Simple effect tests were required in order to interpret this finding because the interaction between reward contingency and age was significant (F=4.5, df=2/54, $p<.05$). These further tests suggested that significant age differences did exist for the Group Reward condition (F=6.6, df=2/54, $p<.01$). Tests on the simple effects of reward contingency showed that time to solution was significantly less with Group Reward than with Individual Reward for 8- to 10-year-olds (F=16.2, df=1/54, $p<.01$) and for 6- to 7-year-olds (F=4.9, df=1/54, $p<.05$). Time to solution did not differ significantly between reward contingency conditions for 5-year-olds.

Discussion

The fact that the 6- to 7-year-olds and 8- to 10-year olds took less time to complete the game task and spent less time blocking each other's progress in the Group Reward condition than in the Individual Reward condition suggests that for these age groups interaction was more cooperative and less competitive with group reward than with individual reward. These differences may be attributed to the fact that the apparent probability that an individual might maximize self-reward by initiating cooperation was greater with group reward than with individual reward. A child in the Group Reward condition could expect that the other child would reciprocate the initiation of cooperation because the other child would lose nothing and gain a reward by so doing. To initiate cooperation in the Individual Reward

condition required forfeiture of the prize on that trial to the other child with the possibility that the other child might not be willing to reciprocate by forfeiting his prize on the next trial.

The only significant age difference in this experiment was in mean time to solution for the Group Reward condition. Older children took less time to cooperatively solve the Pull-block task than younger children. Although it seems likely that 5-year-olds would differ somewhat from 8- to 10-year-olds on any task requiring perceptual-motor skills, it should be noted that the essential ability required for the Pull-block game involves coordinating the actions of two persons. No differences between 5- and 8- to 10-year-olds would be expected for the simple task of pulling a single rope through the opening. The differences arise when two ropes are involved. Insofar as this coordination problem required certain perceptual-motor abilities, it seems likely that all coordination problems, for which cooperation is a solution, require these abilities. Older children might be expected to be more cooperative than younger children in any group reward situation requiring coordination of the actions of two or more persons.

The fact that for both measures of cooperation-competition the differences between reward conditions were significant for only 6- to 7- and 8- to 10-year-olds suggests that the 5-year-olds were less sensitive to reward contingency than older children. It may be that the older children were more responsive to the apparent probability that an individual might maximize self-reward by initiating cooperation.

There were no significant differences between age groups in the Individual Reward condition. This result is similar to that obtained with the Marble-pull game in Experiment I, which also represented a conflict of interest condition. When the apparent probability that an individual might

maximize self-reward by initiating cooperation was at an intermediate level as in Experiment I and Experiment III (Individual Reward condition), there were no significant age differences in cooperation-competition. When the apparent probability was relatively high that an individual might maximize self-reward by initiating cooperation as in Experiment II and Experiment III (Group Reward condition), older children were significantly more cooperative than younger children. Unless the apparent probability was relatively high that an individual might maximize self-reward by initiating cooperation, the competitive responsiveness of older children to a situation where a conflict of interest may exist appeared to interfere with their cooperative and problem solving abilities even when cooperation was required for goal attainment.

As noted in the section on procedure, all children in the present experiment were required to cooperate successfully on three practice trials prior to receiving the reward contingency instructions. Although the purpose of the practice trials was to assure that all of the children understood the workings of the apparatus, the practice trials may also have minimized differences between age groups and between reward conditions. It is possible that the practice trials may have limited competition in the Individual Reward condition by providing a cooperative set. It is also possible that any effects of the practice trials may have been more pronounced for one age group than another. Experiment IV will provide evidence relevant to the possibilities.

Proposed Experiments IV and V

Experiment IV

This experiment is proposed in order to test the hypotheses that were formulated in earlier parts of this paper and in order to further describe the cooperative-competitive behavior of children at various stages of late childhood.

Method

Subjects

Children from one or several Los Angeles public schools will be matched on the basis of sex and age into 60 pairs. There will be 30 pairs of 5-year-olds and 30 pairs of 8- to 10-year-olds with each age group being equally divided between sex. Within each age and sex grouping pairs will be selected randomly and assigned consecutively to one of three experimental conditions. The children will be from schools located in low income areas of Los Angeles.

Apparatus

The Pull-block game described in Experiment III and the Marble-pull game described in Experiment I will be used.

Procedure

Each pair of children will be taken to a small quiet room and be instructed as follows:

> "This is a game where you may get some prizes. During the game you may get some paper coins like these. Every coin is worth one prize. After the game is over, you may choose one prize for every coin that you have gotten. Here are the prizes. How many prizes will you be able to choose if you get two coins?" E will question each S until the coin-prize relationships is understood.

"In this game you try to pull the blocks through this opening. This will be your (child 1) rope, and this other rope will be your (child 2) rope. One thing is very important. See the notches!" E will demonstrate, using the first block on each rope, how one rope must be in the notch in order for a block to pass through. "There are two rules: You are not allowed to touch this (movable plastic part of the apparatus). And you are not allowed to touch the other person's rope or blocks. You may reach behind here (the movable plastic part) and you may use your hands up close like this."

Variations in or additions to these instructions will occur as follows depending on the reward contingency condition:

Group Reward (GR). "If all of the blocks on both ropes are pulled through the opening before I say 'stop,' each of you will get a coin, one for you and one for you. If some of the blocks are not pulled through the opening when I say 'stop,' no one will get a coin. For example, if one block is not pulled through the opening, like this (demonstration), and I say 'stop,' no one will get a coin." E will place six pairs of coins on the table. "The game will be played this many times (E will point to six pairs of coins.), six times. You may talk, and you may play the game any way that you wish."

Individual Reward 1 (IR1). "There will be one coin every time. The first person who pulls their rope all of the way through the opening before I say 'stop' will get the coin. If no one pulls their rope all of the way through, all four blocks through the opening like this (demonstration) before I say 'stop,' no one will get the coin." E will place six coins on the table. "The game will be played this many times (E will point to six coins.), six times. You may talk, and you may play the game any way that you wish."

Individual Reward 2 (IR2). There will be no use of nor mention of the paper tokens in this condition, and the word "prize" will be used in its singular form as though only one prize were to be available. "The person who pulls the most blocks through the opening will get a prize. If all of the blocks are pulled through, then the first person who pulled their rope all the way through will get a prize. Only one person can get a prize in this game. Who will get the prize if the ropes are like this (demonstration of one rope with one block through and another rope with three

> blocks through) and I say 'stop?" Who will get the prize if both ropes are pulled all the way through the opening and this rope is pulled through first? You may talk, and you may play the game any way that you wish."

As soon as one child pulls a rope all of the way through the opening, E will push the switch to deactivate the counter and timer. The second child will be allowed time to pull his rope through the opening also. If neither child pulls his rope all the way through the opening after 20 seconds, E will say "stop" and push the switch. After each trial in the GR and IR1 conditions, E will dispense the paper coins for that trial and remind the children of the number of remaining trials. After each trial in the IR2 condition, E will tell the children how many prizes have been earned by each child to that point and then say "You may choose your prize(s) when we are all done. We are going to play the game again. There will be one prize again this time." If on a given trial in the IR2 condition no child pulls his rope all the way through the opening and no child pulls more blocks than another through the opening, then no one will receive a prize for that trial.

Following the sixth trial on the Pull-block game, all pairs will play the Marble-pull game for eight trials. The instructions for the Marble-pull game will be the same as in Experiment I, and the instructions will be the same for all experimental groups. After the eighth trial on the Marble-pull game, each child will be allowed to choose at least two prizes. The children will be instructed not to discuss the games or the prizes with other children. The prizes and the manner of dispensing them will be similar to that described for Experiment I. The prizes for the Pull-block game will be different than the prizes for the Marble-pull game

Results

Pull-block game. Separate analyses will be done for blocking time and for time to solution. These measures are defined and explained in the results section for Experiment III. For each of the two measures, the results will be statistically analyzed by performing a four-factor analysis of variance (Reward Condition x Trial x Age x Sex) for a design with repeated measures on one factor (Trial).

Marble-pull game. Although all of the children will be given the same instructions for the Marble-pull game, a distinction will be made between three groups of children according to the reward contingency conditions that they experience for the Pull-block game. It is expected that differences in prior experience with the Pull-block game will affect differences between groups on the Marble-pull game.

The measure of cooperative interaction on the Marble-pull game will be the number of trials (out of eight possible) in which a pair cooperates such that a reward is obtained. The results will be treated statistically with a three-factor analysis of variance (Prior Experience x Age x Sex).

Hypotheses and Discussion

Pull-block game. The three reward contingency conditions are expected to elicit varying degrees of cooperation and competition on the Pull-block game. Considering the three conditions in the order: Group Reward (GR), Individual Reward 1 (IR1), and Individual Reward 2 (IR2); it is expected that interaction will be less cooperative and more competitive from one condition to the next. The following paragraphs explain how, from one reward contingency condition to the next, changes occur in the apparent probability of maximizing self-reward by initiating cooperation. According to

Hypothesis I, interaction between two persons will tend to be more cooperative the greater the apparent probability that an individual may maximize self-reward by initiating cooperation.

The apparent probability that a child might maximize self-reward by initiating cooperation is greater in the GR condition than in the IR1 condition. The apparent probability approaches certainty that the initiation of cooperation in the GR condition will lead to maximal self-reward. There is no behavior other than the initiation of cooperation which might lead to equal or greater reward. Both children are expected to be cooperative on every trial in the GR condition because both children may obtain maximal individual reward on a trial by cooperating. In the IR1 condition only one child can be rewarded on a trial. The initiation of cooperation, allowing the other child to pull on his rope without interference, will not result in reward attainment for the child who initiates cooperation unless the second child reciprocates the cooperation on a later trial. There is some reason to expect that the second child might not reciprocate on a later trial because he would have to forfeit a reward on that trial in order to do so. In the GR condition the apparent probability of maximizing self-reward by initiating cooperation is not limited by this factor.

The apparent probability that a child might maximize self-reward by initiating cooperation is greater in the IR1 condition than in the IR2 condition. Although in both of these conditions only one child can obtain reward on a trial, it is possible in the IR1 condition for a child, who assists a second child in obtaining reward, to expect that his cooperative behavior might be reciprocated on a later trial. This is not possible in the IR2 condition where the children will be unaware of the fact that further trials will occur. Also, the salience of interdependency and, in fact, the actual

necessity for mutual assistance is less in the IR2 condition than in the IR1 condition. Although it is nearly impossible for a child to pull his rope all the way through the opening without the willful cooperation of the other child, it is possible for a child to pull one block through the opening if the other child, perhaps unwillfully, allows his rope to slip into the notch at a moment when the first child has a block at the opening. Since it is possible to obtain a reward in the IR2 condition by having one more block through the opening than the other child, there is less necessity for cooperation in the IR2 condition than in the IR1 condition.

The IR1 and IR2 conditions may be considered conflict of interest situations. It is true for these conditions that behavior which might be instrumental to the attainment of one person's goals would also be, at least momentarily, detrimental to the other person's progress toward goal attainment. Progress toward goal attainment is represented here by the movement of an individual's rope through the opening, and while one person's progress is advanced, the other person's progress is at least momentarily blocked. Because cooperation and competition are inverse patterns of interaction in conflict of interest situations, the prediction that interaction will be more cooperative in the IR1 than the IR2 condition may also be considered as a prediction that interaction will be more competitive in the IR2 than the IR1 condition.

One purpose of the present experiment is to compare the cooperative and competitive behaviors of 5-year-olds with that of 8- to 10-year-olds. The results from Experiments I, II, and III suggested that older children were more cooperative than younger children only when the apparent probability was relatively high that a child might maximize self-reward by initiating cooperation. There were no significant age differences when this

"apparent probability" was at an intermediate level. Judging from these experiments it seems likely that if age differences appear in the present experiment, older children will be more cooperative than younger children in the GR condition where the apparent probability is relatively high that a child might maximize self-reward by initiating cooperation.

In the IR2 condition the apparent probability of maximizing self-reward by cooperating approaches zero. An assumption that this situation will elicit a maximum of competition seems justified for the IR2 condition. If so and assuming that older children have a greater capacity for competition than younger children, the 8- to 10-year-olds are expected to be more competitive than the 5-year-olds in the IR2 condition.

Marble-pull game. The effects of various prior experiences upon the interaction of children in a conflict of interest game will be examined. The three reward contingency conditions for the Pull-block game are expected to produce three different kinds of prior experiences. Because the Marble-pull game will be played immediately after the Pull-block game and because of similarities in the game situations, it is expected that some transfer of training will occur from one game to the next.

Reinforcement theory may be used to predict that the GR prior experience will lead to more cooperative interaction in the Marble-pull game than will the IR2 prior experience. This prediction assumes that cooperative responses will occur and be rewarded in the GR condition and that competitive responses will occur and be rewarded in the IR2 condition.

There is some possibility that children in the IR1 prior experience condition will learn to cooperate as a strategy for resolving conflict and maximizing self-reward. The trial data for the Pull-block game should provide some evidence relevant to this possibility. If such a strategy is

learned, it would, according to Hypothesis II, be expected to transfer to the Marble-pull game. This suggests that IRl prior experience group might be as cooperative or possibly more cooperative in the Marble-pull game than the GR prior experience group. Although children in the GR condition are expected to cooperate and be rewarded, they are not expected to learn to cooperate as a strategy for resolving conflict because the GR condition is not a conflict of interest situation.

Experiment V

Experiment V is designed, as was Experiment IV, to examine for different age levels the effects of various reward contingencies and various prior experiences upon the interaction of children. A different game will be used in the present experiment in order to create interaction situations which in some conditions will be quite comparable to the situations in Experiment IV, but will in other conditions involve different situations of theoretical interest. Also the effects of prior experiences will be investigated more thoroughly than in Experiment IV. Certain effects which may not be limited to particular dyads will be studied by switching members of dyads and forming new dyads following certain prior experience conditions.

Method

Subjects

Children from one or several Los Angeles public schools will be matched on the basis of sex and age into 140 pairs. There will be 70 pairs of 5-year-olds and 70 pairs of 8- to 10- year-olds with each age group being equally divided by sex. Within each age and sex grouping, pairs will be selected randomly and assigned consecutively to one of seven experimental conditions.

The children will be from schools located in middle-income areas of Los Angeles.

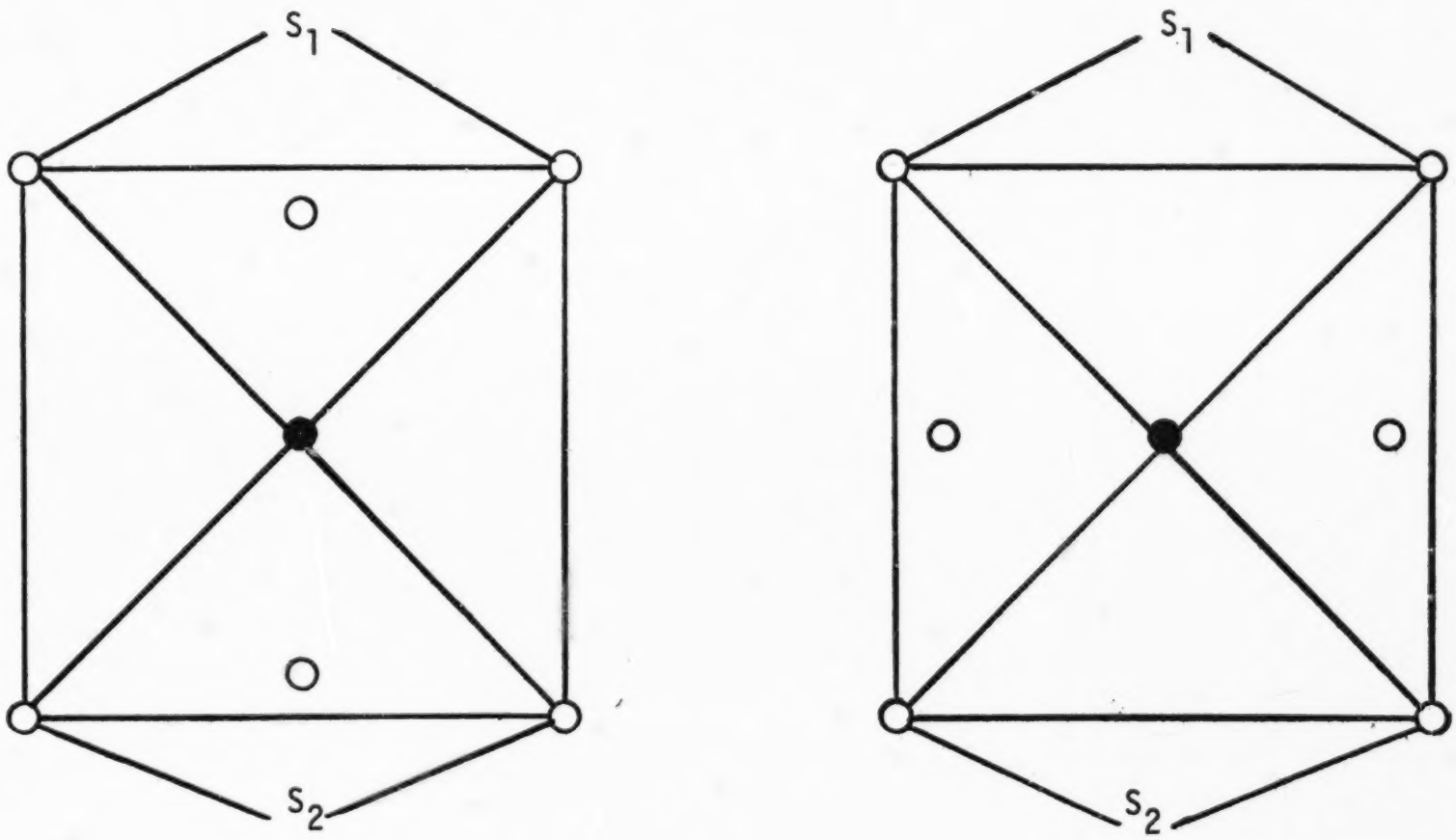
Apparatus

Two forms of the Cooperation Board game will be used. The dimensions and essential parts of the Cooperation Board game are displayed in Fig. 2 and described in the apparatus section of Experiment II. The two forms of the Cooperation Board to be used in this experiment may be seen in Fig. 4. Each form has two target spots, but the arrangement of the spots vis-a-vis the two subjects varies. In order for the pointer to touch a target spot on form 1 of the Cooperation Board, one S must pull on both strings under his control and the other S must not resist by pulling against the first S. In order for the pointer to touch a target spot on form 2 of the Cooperation Board, each S must pull on one string and let loose of the other string under his control, and both Ss must pull on the strings at the same side of the board.

Procedure

Every pair will be taken from the classroom to a small office and be told, "This is a game where you may get some prizes. First, I will tell you about the game." Each pair will then receive instructions in the use of either form 1 or form 2 of the Cooperation Board.

> Form 1. "This is the pointer. The pointer can be moved on the board by pulling strings. Each of you has two strings to pull, one string for each hand. See if you can make the pointer move here." E will assist until the children can move the pointer from several places on the board to a given target spot. "Now see if you can make the pointer move here." Ss will practice moving the pointer to the other spot.
>
> Form 2. "This is the pointer. The pointer can be moved on the board by pulling strings. You each have two strings. In this game you may pull only one of your strings at a time. Don't pull both strings at the same



Form 1

Form 2

Fig. 4. Forms of Cooperation Board for Experiment V

time. Pull whichever one of your strings that you wish. You may start by pulling one string and then switch and pull the other string, but only pull one string at a time." The children will practice moving the pointer to one target spot and then will practice moving the pointer to the other target spot.

Following this, either six paper tokens or six pairs of paper tokens will be placed on the table. The children will be told that each token is worth one prize and that the tokens may be exchanged for prizes at the end of the game. The children will be questioned to assertain whether the token-prize relationship is understood, and they will be given an opportunity to see the prizes which they may choose from. One of the three reward contingencies will then be explained.

Group Reward (GR). Six pairs of paper tokens will have been placed in view of the children. "There will be two coins each time. The game will be played six times (E will point to coins.). If the pointer touches both spots, here and here, before I say 'stop,' you will each get one coin, one for you and one for you. If the pointer does not touch both spots before I say 'stop,' if only one spot is touched for example, no one will get a coin."

Individual Reward 1 (IR1). Six pairs of paper tokens will have been placed in view of the children, and one child's name will have been printed on one target spot and the other child's name on the other target spot. "There will be two coins each time. The game will be played six times (E will point to coins.). If the pointer touches the spot with your name on it before I say 'stop,' you will get one coin. Each person whose spot is touched before I say 'stop' will get a coin. If the pointer does not touch your spot before I say 'stop,' you will not get a coin that time."

Individual Reward 2 (IR2). Six paper tokens will have been placed in view of the children, and one child's name will have been printed on one target spot and the other child's name on the other target spot. "There will be only one coin each time. The game will be played six times (E will point to coins.). If the pointer touches here (spot with name of child 1) first, child 1 (name) will get the coin. If the pointer touches here (spot with name of child 2) first, child 2

(name) will get the coin. If the pointer does not touch any spot before I say 'stop,' no one will get that coin."

All of the children will be told that talking is allowed and that they may play the game any way they wish. The time limit for each trial will be 15 seconds. All pairs will play the Cooperation Board game for 12 trials, and on trials 7-12 all pairs will play form 2 of the Cooperation Board game with instructions for the IR2 reward contingency. Instructions and procedure prior to trial 7 will vary for the seven experimental conditions listed below. Each condition is listed according to the reward contingency and form of game to be used on trials 1-6 for the children in that condition.

1. Group Reward (form 1)
2. Group Reward (form 2)
3. Individual Reward 1 (form 2)
4. Individual Reward 2 (form 1)
5. Individual Reward 2 (form 2)
6. Group Reward (form 1), Switched Pairs
7. Individual Reward (form 1), Switched Pairs

For trials 1-6 in conditions 4 and 7, each child's name will be printed on the target spot that is on the far side of the board from that child. The children in conditions 6 and 7 will have different partners on trials 7-12 than on trials 1-6. The procedure for these conditions will involve having first one and then another pair in the same condition play the game for trials 1-6 only. Following this, one child from the first pair and one child from the second pair will return to the experimental room to form a new pair for trials 7-12. Then the remaining children, one from each original pair, will be tested.

Following the sixth trial, the children in all conditions will be told, "Now the game will be changed." Then the instructions for the IR2 (form 2) situation will be given. Children in the IR2 (form 2) condition will simply be told, "Now the game will be played six more times."

After the twelfth and final trial, each child will be allowed to choose at least two prizes. The children will be instructed not to discuss the game or the prizes with other children. The prizes and the manner of dispensing them will be similar to that described for Experiment I. The prizes for trials 7-12 will be different than the prizes for trials 1-6.

Results

Time to solution. The experimenter will record for each trial the time in seconds between the signal to begin a trial and the touching of the pointer to a target spot. This measure will be called "time to solution." For those conditions in which a trial may continue until both target spots are touched by the pointer, the E will also record the time in seconds between the signal to begin a trial and the touching of the pointer to the second target spot. There will be separate analyses of the results from this second measure only if it does not correlate highly with time to solution.

In the Individual Reward conditions it will be impossible for a child to move the pointer to his own target spot without the assistance of the other child. In the Group Reward conditions it will be either impossible (GR, form 2) or very difficult (GR, form 1) for a child to move the pointer to a target spot without the assistance of the other child. So, the lower the time to solution, the greater will be the indication of cooperative interaction.

The first analysis will be concerned with time to solution on trials 1-6 for the following five conditions: GR (form 1),GR (form 2),IR1 (form 2), IR2 (form 1), and IR2 (form 2). The results will be statistically analyzed by performing a four-factor analysis of variance (Reward Condition x Trial x Age x Sex) for a design with repeated measures on one factor (Trial). A second analysis will be concerned with time to solution on trials 7-12 for all seven experimental conditions. Trials 1-6 of the IR2 (form 2) condition will also be included in this analysis in order to compare a group having no prior experience with the seven prior experience groups. The statistical analysis of these results will be the same as for trials 1-6 except that there will be eight levels for the reward condition factor.

Cooperation trials. This measure will represent for each pair the number of trials (out of six possible) on which the children successfully cooperate such that all of the available prizes are obtained by the children. Again there will be two separate analyses, one for trials 1-6 and another for trials 7-12. Each analysis will involve a three-factor analysis of variance (Reward Condition x Age x Sex). As for the time to solution analysis, five reward conditions will be compared for trials 1-6 and eight prior experience conditions will be compared for trials 7-12.

Hypotheses and Discussion

Trials 1-6. It is expected that children will be more cooperative on trials 1-6 in the GR (form 2) condition than in the IR1 (form 2) condition and will be more cooperative in the IR1 (form 2) condition than in the IR2 (form 2) condition. These predictions are based on Hypothesis I which states that interaction will be more cooperative the greater the apparent

probability that an individual might maximize self-reward by initiating cooperation. This "apparent probability" is very high in the GR (form 2) condition because the partner of a child who initiates cooperation would obtain a prize by reciprocating cooperation and he would not obtain a prize if he failed to cooperate.

The apparent probability of maximizing reward by initiating cooperation is less in the IR1 (form 2) condition because if one child initiates cooperation by helping the second child move the pointer to the second child's target spot, there is some reason to believe that the second child might fail to help the first child obtain a prize. Once the pointer had touched his target spot, this second child would obtain a prize regardless of whether or not he went on and helped the first child move the pointer to the first child's spot. The existence of a time limit also adds to the possibility that a strategy of letting the other child initiate cooperation might lead to greater self-reward than to initiate cooperation. This possibility lowers the apparent probability that a child might maximize self-reward by initiating cooperation.

The apparent probability of maximizing reward by initiating cooperation is even less in the IR2 (form 2) condition than in the IR1 (form 2) condition. To initiate cooperation in the IR2 (form 2) condition by helping a partner move the pointer to his target spot would mean that the child who initiates cooperation would not obtain reward on that trial. There is also reason to expect that the child who was the recipient of help on one trial might not reciprocate on the next trial. To reciprocate by helping the child who first initiated cooperation to receive a prize would require that the reciprocating child forfeit his prize on the second trial. In the IR1 (form 2) condition, neither the initiation nor the reciprocation of

cooperation would require forfeiting a prize on a trial.

Hypothesis I may also be used to predict that children will be more cooperative on trials 1-6 in the GR (form 1) condition than in the IR2 (form 1) condition. This prediction may be derived in the same manner as for the predicted difference between the GR (form 2) and IR2 (form 2) conditions.

It is expected that the difference between form 1 and form 2 of the Cooperation Board will affect differences in cooperative-competitive interaction on trials 1-6 when the IR2 reward contingency is in effect. In the IR2 conditions a child may obtain reward only if the pointer moves to that child's target spot. For the IR2 (form 1) condition, a child can do nothing to make the pointer move toward his own spot. It should be very obvious to the child that he might obtain a prize only if the other child does the pulling. This will be considered a high salience of interdependency situation. Although it is also true for the IR2 (form 2) condition that a child cannot make the pointer touch his own target spot without help from the other child, this fact is somewhat obscured by the child's ability to move the pointer in the general direction of his own target spot by pulling on one string. During the practice trials for the IR2 (form 2) condition, each child will learn that when he pulls on a certain string, the pointer moves to his target. The child may or may not become aware of the fact that the other child must also pull on a certain string in order for the pointer to move to the first child's target. The comments of young children in the IR2 (form 2) condition in an earlier study (Nelson & Madsen, 1969) suggested that the children were often unaware of the need for mutual assistance. The interdependency is less salient in the IR2 (form 2) condition than in the IR2 (form 1) condition.

For the situation with the greater salience of interdependency, the apparent probability of maximizing self-reward by initiating cooperation is also greater. When the interdependency is less salient, a child might believe that self-reward is obtainable through vigorous competition. Such a possibility would certainly reduce the apparent probability of maximizing self-reward by initiating cooperation. So Hypothesis I may be used to predict that interaction will be more cooperative in the IR2 (form 1) condition than in the IR2 (form 2) condition.

The differences between form 1 and form 2 are expected to have much less effect in the GR conditions. Since there exists no conflict of interest in the GR conditions, it seems likely that all pairs will discover the cooperative solution and will interact cooperatively at least on the later trials. If pairs in the GR (form 1) and GR (form 2) conditions are equally cooperative on the later trials, this evidence will support the explanation which suggests that any differences produced by the IR2 (form 1) and IR2 (form 2) conditions are the result of differences in salience of interdependency and not simply the result of differences in task difficulty.

Another matter of considerable interest will be the interaction between age and the effects of reward contingency and salience of interdependency. Judging from Experiments I, II, and III, the 8- to 10-year-olds might be expected to be more cooperative than the 5-year-olds only when the apparent probability is relatively high that a child might maximize self-reward by initiating cooperation. This suggests that the older children are more likely to be more cooperative than the younger children in the GR, IR1, and IR2 (form 1) conditions than in the IR2 (form 2) condition.

Trials 7-12. Hypothesis II states that in a situation where cooperation is necessary in order for individuals to resolve a conflict of interest

and to obtain self-reward, the individuals will be more cooperative if they have previously learned to cooperate as a strategy for resolving conflict and maximizing self-reward. All of the children on trials 7-12 will interact in a situation where cooperation will be required in order to resolve a conflict of interest and to obtain reward. Only the children in the IR1 (form 2), IR2 (form 1), and IR2 (form 2) conditions will also have interacted in a conflict of interest situation on trials 1-6.

It was predicted that the children in the IR1 (form 2) and IR2 (form 1) conditions would be more cooperative on trials 1-6 than children in the IR2 (form 2) condition. Assuming that this difference will be maintained through trial 6, it appears likely that more children will learn to cooperate as a strategy for resolving conflict and maximizing self-reward during trials 1-6 in the IR1 (form 2) and IR2 (form 1) conditions than in the IR2 (form 2) condition. Hypothesis II may then be used to predict that children in the IR1 (form 2) and IR2 (form 1) conditions will be more cooperative on trials 7-12 than children in the IR2 (form 2) and Control (no prior game experience) conditions.

It is specifically hypothesized that children in the IR1 (form 2) and IR2 (form 1) conditions will be more cooperative on trials 7-12 than children in the IR2 (form 2) and Control conditions as the result of learning to cooperate as a strategy for resolving conflict and maximizing self-reward, and not as the result simply of having been reinforced for a general cooperative orientation. Supporting evidence for this hypothesis may be obtained by comparing the GR conditions with the IR1 (form 2) and IR2 (form 1) conditions. It is expected that the children in the GR conditions will learn to cooperate on trials 1-6 and that they will be reinforced for cooperative responses. Reinforcement theory may be used to predict that these cooperative

responses will to some degree transfer to the situation in trials 7-12, and as a result, the children in the GR conditions will be more cooperative on trials 7-12 than the children in the Control condition having no prior game experience.

If the effect of the prior experiences upon the interaction of children in the IR1 (form 2) and IR2 (form 1) conditions is the result of some factor in addition to being reinforced for a general cooperative orientation, then the children in the IR1 (form 2) and IR2 (form 1) conditions may be more cooperative on trials 7-12 than children in the GR conditions. If this result is obtained, it may be attributed to the fact that only the children in the IR1 (form 2) and IR2 (form 1) conditions learned to cooperate as a strategy for resolving conflict and maximizing self-reward.

It is possible that the effects of the prior experiences in increasing cooperative interaction on trials 7-12, assuming such effects will be obtained, may be explained as a result of the development of mutual trust between dyad members who may have interacted cooperatively on trials 1-6. Assuming that children in the GR conditions will be more cooperative on trials 7-12 than children in the Control condition, the explanation may be offered that on trials 1-6 a mutual trust between dyad members may have developed in the GR conditions which carried over into trials 7-12 and which was absent for dyads in the Control condition that had no prior game experience.

Assuming that children in the IR1 (form 2) and IR2 (form 1) conditions will be more cooperative on trials 7-12 than children in the GR conditions, the explanation may be offered that on trials 1-6 pairs of children in the IR1 (form 2) and IR2 (form 1) conditions may have learned to trust one another in a conflict of interest situation and this trusting relationship

may have carried over to the conflict of interest situation on trials 7-12. Because the GR conditions are not conflict of interest situations, it may be explained that the trusting relationships which may have developed for pairs in the GR prior experiences may not have transferred as well to the conflict of interest situation on trials 7-12 as the trusting relationships which may have developed for pairs in the IR1 (form 2) and IR2 (form 1) prior experiences.

In order to investigate the degree to which the prior game experiences affect individuals independently of the effect upon the relationships between members of particular dyads, the dyad members in two experimental conditions will be switched prior to trials 7-12. If the effects of the prior experiences in increasing cooperative interaction on trials 7-12 are somewhat limited to the particular dyads of children who are paired together on trials 1-6, then the children in the GR (form 1) Switched Pairs condition and/or the IR2 (form 1) Switched Pairs condition should be less cooperative on trials 7-12 than the children in one or both of the comparable conditions where pair members will not be switched.

If the GR (form 1) and/or the IR2 (form 1) prior experiences have a positive effect upon individuals' cooperative behaviors that is somewhat independent of particular dyad relationships, then the children in one or both of the two Switched Pairs conditions should be more cooperative on trials 7-12 than the children in the Control condition. And finally, if the IR2 (form 1) prior experience has a greater positive effect upon cooperative interaction on trials 7-12 than does the GR (form 1) prior experiences, and if this difference is not the result of a differential effect upon relationship between members of particular dyads, then children in the IR2 (form 1) Switched Pairs condition should be more cooperative on trials 7-12 than children in the GR (form 1) Switched Pairs condition.

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